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## Original Contributions.

### PREPARATION, TREATMENT AND FILLING OF THE ROOTS OF TEETH.

BY L. G. NOEL, D.D.S., NASHVILLE, TENN. READ BEFORE THE SOUTHERN BRANCH OF THE NATIONAL DENTAL ASSOCIATION, AT WASHINGTON, FEBRUARY 23-26, 1904.

Wishing to avoid as much as possible the utterance of trite wisdom on the topics I have chosen, and to treat them with the brevity consistent with clearness, I shall omit much detail, remembering that my audience is made up of skilled operators, who are capable of grasping a mere suggestion. I must at the beginning crave the indulgence of those who can tolerate only new and original thought, and remind them of the extreme rarity of fresh ideas on any old subject. My subject being as old as operative dentistry, I must of necessity traverse much familiar ground in the hope of either calling your attention to things often overlooked, or of bringing you to see familiar things in a better light by approaching them from another point of view.

I assume that I may lay down as an established rule that will apply to all classes of teeth in the human denture that the pulp-chambers should by preference be opened from the occlusal, morsal, or cutting surface, so that instruments may be directed into the roots along the line of the axis of the tooth. This rule, like many others, will be found subject to modification under varying circumstances, but these will not affect the cardinal principle that we must obtain direct and easy access to all the roots from the pulp cavity. This will best be accomplished by opening the pulp cavity as above described whenever this means of approach may be deemed judicious.

Having penetrated the pulp-chamber from the morsal aspect or roof, care must be taken not to mar or alter the shape of this cavity

at any other point. The roof may be removed and the pulp-chamber laid open by means of pointed-fissure burs or bud-shaped burs. Some manufacturers are turning out flame-shapes in cross-cut instruments that are admirable for this purpose. The alteration of the pulp-cavity at its floor or alveolar aspect should be avoided as much as possible in molars and bicuspids, because injudicious cutting here may result only in opening false pits for the catching or misguidance of the instrument.

Whenever it is possible to find entrance into the pulp canals for the broach these may be sufficiently enlarged, cleansed and excavated by patient or continued broaching. I need not weary you by repeating the old caution against reaming with engine burs. You will recall many mishaps of your own and many that you have seen from other hands as the result of this practice. On opening pulp canals it will be a good plan to make haste slowly. The flexible, twisted reamers, with short, corrugated handles to be turned in the fingers, may be employed after the canals have been opened by the broach and the contents removed. These will be found especially useful in opening the flattened canals in the anterior roots of the lower molars.

In opening the molar teeth frequent syringing should be done to remove debris and prevent the clogging and occluding of canals. This should also be done in reaming, and the broach should be used frequently to clear the way. The syringe is not used enough in operative dentistry, and thus debris is often left sticking around the cavities because we are too sparing in the use of water. Abundant irrigation with warm water heavily charged with hydrogen peroxid and formalin will be found useful, especially in septic cases. The fact of having the rubber dam in place should not prevent this.

Pulpless teeth may be divided into two classes—septic and non-septic. Treatment: Having opened the pulp canal (or canals) and removed the contents, the treatment will vary according to the class under which the case in hand may be catalogued. The septic class will comprise all those teeth in which death of the pulp has resulted from the penetration of caries and inflammation caused by the invasion of microorganisms. It will embrace also all cases where pulps die under fillings or crowns, and where the putrescent contents are left in pulp chambers and canals, and all cases where portions of the pulp tissue are left as the result of imperfect extirpation,

and fillings are introduced without the necessary precautions of burning out and sterilizing by the use of proper agents. The non-septic cases will be those only from which living pulps have recently been removed.

Treatment of the septic cases: After thorough opening and removal of contents, in which case care must be taken not to force septic matter through the apical foramen, we should give the patient a period of rest to allow the pericemental inflammation to subside. In some instances this will mean days and in others weeks. Many of these more obstinate cases will present the peculiarity of a manifestation of pain always upon the passage of a broach into the canal, and frequently showing blood or bloody pus upon its withdrawal. Sometimes this bloody discharge wells up into the canal after the removal of the broach. These cases will not tolerate tight cotton dressings while this condition lasts, but must be loosely dressed, so that they may drain. It is my practice to syringe out with equal parts of formalin and hydrogen peroxid, diluted with warm water until about blood temperature. In these washings care must be taken not to force the fluid into the roots. Where the syringe is not well borne, I wipe out with this fluid with cotton on the broach. I have found oil of eucalyptus the blandest and least irritating dressing to leave in the canal. This may be supplemented, as soon as fairly tight dressing can be borne, by powdered orthoform or aristol. This may be left in the canal until the tooth will bear slight percussion without pain.

It is safer in these cases not to risk a permanent filling until a temporary tight stopping has been tried. This may be a thread of silk floss or a wisp of cotton saturated with oil of eucalyptus or oil of cinnamon to stop the root canals and the pulp chamber, the remainder of the cavity being filled with gutta-percha. If this stopping is tolerated for a fortnight, and all pericemental inflammation has subsided, as evidenced by the absence of pain upon percussion, we may safely introduce the permanent filling.

Treatment of non-septic canals: These usually require little or no treatment beyond checking the hemorrhage and the flow of serum into the canal. The non-septic are those from which the healthy pulp has just been removed, and are the only roots that may be safely treated by immediate filling. After extirpation of the pulp creosote upon a broach with cotton will relieve the sensitiveness and

tend to check the flow of blood. This may be followed by a thorough cauterization with a root-canal drier—the best means of checking the flow of blood or serum. We are now ready for the permanent filling.

I approach the description of my method of filling root canals with timidity, because I am not satisfied with it. I feel that it is not perfect; that it needs to be improved; that it is not applicable to all cases, and that in some instances it is difficult to perform. It is not new, nor is it original, yet it bears the stamp of approval of the best operators in the profession, notwithstanding my feeling that it is not perfect and must some day be supplanted by another and better method. The good results I have seen give me faith in it, and the hope that it may be at least the first step toward the better and more perfect operation.

The stability and enduring nature of gutta-percha, together with its non-irritating property, its non-conductivity of heat and electricity, and its easy solubility and plasticity, all commend it to us as a suitable material for the filling of root canals. The closure of the apex of a root is conceded to be the sine qua non to success in root filling. I believe this to be as easy of accomplishment with gutta-percha as with any material that has yet been suggested, and I know from experience that it excites no irritation nor inflammation if a little should be forced through into the track of an old sinus. In talking with Dr. Black once on this subject I asked him the question: "How can gutta-percha be placed in a root canal that cannot be dried?" His answer has influenced all my practice in this operation from that day to this. He said: "First displace the water with oil of eucalyptus, which you can easily do by introducing the oil on a cotton-wound broach; then, since the oil of eucalyptus is a solvent for gutta-percha, you may introduce chloro-percha into this menstruum without difficulty." Thus I got an idea that has been helpful to me, and upon which I trust that I have builded well. My method may be briefly stated as follows:

Dryness is a condition to be desired, and when practicable should be obtained by application of the rubber dam, etc. Having removed all moisture, the canal should be filled with eucalyptus oil, as previously suggested. For making antiseptic chloro-percha, I keep ever ready an ounce bottle of chloroform in which have been dissolved forty grains of aristol, always accessible likewise is a sheet

of red base-plate gutta-percha. Pouring a half-teaspoonful of the aristol mixture upon this sheet, it is quickly spatulated into a syrupy consistency and is then ready to be introduced into the canal. The solvent is improved by adding eucalyptus oil to the chloroform in order to prevent the too-rapid evaporation and drying of the gutta-percha. It may be compounded thus:

Chloroform,
Eucalyptus, aa SS fl ℥
Aristol, gr. 40
M.

The canal having previously been wetted with the oil, the chloro-percha is led by capillary attraction into the finest parts. A gutta-percha point is introduced as a central core, and pressed as tight as possible, when the operation of root-filling may be said to be complete. The introduction of gutta-percha points is not as easy as the novice would infer from a description of the method. It will become easier when we find a method of making the gutta-percha points stiff, yet flexible. As we get them from the manufacturers they have a most provoking tendency to double upon themselves and refuse to find their way into the canal. This difficulty may be overcome to a certain extent by the use of a suitable flexible smooth broach for catching the gutta-percha, stopping at or near its point, and thus supported it may be carried into the canal. Such instruments I make from old broaches after the barbs become dulled or broken off. They must be highly polished and sharp as fine needles at their points. After the point is carried well up an old serrated flexible root-canal plugger should be thrust in at the orifice to hold the mass in the canal while the broach is being withdrawn. This latter instrument will be found useful for packing the whole mass tightly in the canal. It should be used cold, for it penetrates the mass when heated and hence may bring all away when withdrawn.

Discussion. *Dr. R. H. Jones,* Winston, N. C.: I was especially impressed with the method of treating the canal when it is in such a condition that we are afraid to cut into it for fear of future trouble, and I shall give the eucalyptus oil a good trial. Many of the points set forth by Dr. Noel will be of great advantage to us in the treatment of these cases.

*Dr. J. Hall Moore,* Richmond, Va.: For nearly fifteen years I have been in the habit of filling root canals with tin or lead. You

can buy the little points from the dental depots, but most of them are not large enough, so I have the lead or tin drawn out at the depot or at a jeweler's into thin wire of different sizes. You can make the points yourself, if you like, with a draw plate, drawing the material into thin wire of different sizes. Then cut this wire into short pieces, and dress them down with a coarse file to a size a little larger than the canal. I force the point into the canal with a blunt-pointed plugger, and in large canals sometimes first dip the points into thin cement. Of course, I am very careful about putting any filling into a canal until sure that it is in proper condition, and during fifteen years I have never had trouble by this method. It not only saves time, but gives a perfect root filling.

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## THE PRESERVATION OF DECIDUOUS MOLARS AND CUSPIDS.

BY N. N. VANN, D.D.S., ATTALLA, ALA. READ BEFORE THE SOUTHERN BRANCH OF THE NATIONAL DENTAL ASSOCIATION, AT WASHINGTON, FEBRUARY 23-26, 1904.

If parents would only forget for a period that the first set of teeth which nature has so wisely given to children is deciduous inestimable good would redound to all future generations, but with "temporary," "first," "baby," "milk" teeth and other synonomous terms ever before them they forget their real meaning and apparently conclude that anything which is temporary is of no value, especially if some trouble and expense are necessary to its maintenance. They should remember that while these words signify shortness of duration it is a definite duration, and the premature loss of these teeth is disastrous. The average guardian estimates the deciduous teeth about the same as the terrible three-months colic—"of but few days and full of trouble."

*Eruption of First Temporary Teeth.*—The appearance of the first deciduous tooth is an important epoch in the child's history, for after the youngster has bitten continuously every accessible article from the thimble to its mother's chin, and passed many sleepless hours, and been drenched with countless doses of the various soothing syrups, asafetida and other toothsome delicacies, the fond, careworn mother, having followed the advice of her enlightened (?)

family physician "to let nature take its course," at last detects the sharp cusp with her finger. The father is 'phoned to come home in great haste, and letters are written to grandparents, uncles and aunts, bearing the good news that "the lost is found" and that he who was almost dead is alive. Yes, I repeat with emphasis, it is one of the most important epochs in the history of a human being. Nature has begun planting two rows of beautiful and indispensable pearls, upon whose preservation hinges to a great extent the future health, beauty and intellect of their possessor. "But 'tis true, 'tis pity, and pity 'tis 'tis true" that within a short time many of these very proud guardians tell the dentist to "pull them out; they are only baby teeth and are not worth saving." Oh, foolish ones, think you that the Creator would subject this tender infant to the dangerous ordeals of first dentition if the teeth were of so little value? Oh, that we could convince parents of their intrinsic value, and that by preserving them the little one would be free from pain, could properly masticate his food, and the perfection of the arch for the permanent teeth would be maintained. Adults readily appreciate the importance of alleviating pain, therefore the greater task for the dentist is to convince them of the importance of thorough mastication and preservation of the arch.

*Mastication.*—Thorough mastication and insalivation are prerequisites to digestion. Either faulty mastication or insalivation or both are forerunners of indigestion with all of its attending evils. If one has a perfect set of teeth until old age and then becomes edentulous he may never suffer from indigestion. The reason is very plain—he has acquired the habit of thorough mastication, and though he be toothless yet he will thoroughly chew his food, perfectly insalivating it. Not so with the one whose deciduous teeth were prematurely rendered incapable of performing their function. Not infrequently is it the case that caries, which develops so rapidly at that age, has destroyed almost the entire crown of the molar and is not detected until pain, nature's only danger signal, is experienced when hard particles of food, cold water, acids or sweets are impacted into the cavity during mastication. The child at once carefully places his food on the opposite side and guards at all times his sensitive tooth. Unilateral mastication is not thorough mastication at any age, and especially not in the mouths of children, the space being very small and the child tending to eat hurriedly. Since neither

side is immune, if the dentist is not consulted the molars on the opposite side before long are fully as badly broken down and mastication becomes a painful ordeal. Soon the little sufferer is compelled to swallow his food unmasticated and not insalivated, the avoidance of pain, and in many instances the dentist, being his prime object. The sensitive teeth can be treated by the skillful dentist and be made to render good service for their allotted time, but the habit of swallowing food unmasticated when once acquired is corrected by very few. Hence we see many adults with all their permanent teeth in situ who do not properly masticate their food and are consequently afflicted with indigestion.

*Preservation of the Arch.*—Every dentist knows that as the boards placed in position before the pouring of a concrete wall are essential to the beauty and usefulness of the permanent structure, just so the temporary teeth, arranged by an all-wise Creator, are expected to remain and jealously guard the space until time for eruption of their successors. The sequelæ to premature loss are too well known for me to attempt to enumerate them.

*Classes of Cavities.*—In order to better discuss the different classes of cavities I will take them up separately.

*Superficial Cavities.*—Many times all that is necessary is to thoroughly polish away the decay and stain with silver nitrate. I might say that it is my custom to stain all cavities, whether followed by filling or not, in posterior temporary teeth with silver nitrate. Should the cavity be so deep as to require filling amalgam is the material that should be used in occlusal cavities, having first lined the cavity with a resinous solution. In small proximal cavities when convenient the teeth should be separated by previously packing cotton into the cavity and allowing it to remain for a few hours. This enables the dentist to better fill the tooth, restoring the contour and thereby preserving the arch. When the teeth are separated these cavities, if not too badly decayed, can be filled without cutting through to the occlusal surface, and should be filled with either copper amalgam or gutta-percha. However, in most cases they have already broken through and should be prepared and filled with amalgam, cutting away the frail walls and securing anchorage on the occlusal surface as in permanent teeth. Under the head of superficial cavities we usually find caries in the cuspids. Owing to the fact that they are not so susceptible to decay many remain through-

out their allotted time without deteriorating at all, and their location being more conspicuous caries is easily detected by the parent, or by the dentist while treating the molars. Cavities on the distal surface should be filled with gutta-percha, while those on the mesial should be filled with cement. Often there is not sufficient room for the eruption of the permanent lateral incisor, and the dentist is asked to extract the temporary cuspid "to make room" for the approaching lateral. This should never be done, since the premature loss of these teeth lessens room.

*Deep Cavities.*—Could we always see our patients while the cavities are small and shallow we would experience no trouble in preserving the teeth and retaining our patients, but in most cases trouble is encountered before the dentist is consulted. Great care should be taken to not inflict unnecessary pain in breaking down the frail walls. The point of the instrument should be so guided that it will not plunge into the bottom of the cavity but force toward the wall. In almost every case both occlusal and proximal surfaces are badly decayed, and the two cavities should be united. If the child becomes too nervous the cavity should be packed with a pledget of cotton saturated with Fletcher's carbolized resin or one of the essential oils and sealed in with temporary stopping, and the patient dismissed for a few days. The decay can usually be removed with little trouble when the child returns, but if the tooth is still sensitive the cavity should be washed out with warm water, and a paste made of cocain crystals and carbolic acid applied; follow this with soft wax and use pressure as in removing the pulp. By placing a pledget of cotton saturated with alcohol on the soft wax before using pressure injury to the soft tissues by the carbolic acid will be prevented, the alcohol neutralizing it. The soft tissues should also be protected and precaution taken by the use of cotton rolls or napkins to prevent the medicament escaping into the mouth and throat. The decay can then be removed very easily. While our chief object is preservation of the teeth, yet we must by all means retain our patients, for on this hinges success. If the pulp is not too near amalgam is the best filling material, and I have had good results from the use of copper amalgam where the proximity of the pulp would forbid other amalgams. This material is not a panacea, but it is less irritating, requires very little retentive form, and in cases where it is impossible to keep the parts perfectly dry it is supreme.

If the proximal surface of the adjoining tooth is also decayed only one should be filled at a sitting. The matrix should be used when the patient will allow it, and the proximal surfaces should be well contoured, thereby preserving the arch and rendering thorough mastication possible. Where closeness of the pulp forbids the use of amalgams, gutta-percha and cement—preferably oxyphosphate of copper cement—must be used. These materials must be watched closely, as they are only temporary in this class of cavities. Cements wash out at the gum margins and the pulp is exposed before either the dentist or the patient suspects deterioration. Gutta-percha is not deceptive and in some cases withstands mastication for a long time, but in most occlusal cavities it is soon detrite and must be replaced. It is not necessary that the walls be perfectly smooth, as uneven walls help retain gutta-percha. In case the adjoining tooth is badly decayed the material should be bridged over, using a metal guard to protect the gum. Continued mastication on this will cause spreading of the teeth, and in many cases this is beneficial, the posterior tooth having dropped, there being no resistance after the proximal surfaces of the lower one were broken down. Where the retentive form is inadequate for gutta-percha cement should be used. The filling should be coated with paraffin for protection against the fluids of the mouth, or warm temporary stopping held under the finger will protect it for a while.

*Pulps Exposed.*—After removing the debris with warm water, if the patient is not very nervous one can by thoroughly protecting the soft tissues with cotton rolls or a napkin remove the pulp by pressure anesthesia, using a paste of carbolic acid and cocain crystals. Where this is contraindicated a paste made of oil of cloves, iodoform and a crystal of cocain should be applied to the pulp and sealed. The patient should then be dismissed with instructions to return when the tooth becomes sore. This may be in a fortnight or it may never give any further trouble. When the patient returns the pulp should be removed, the canals treated once or twice, and then filled with forma-percha, followed by gutta-percha. It is best not to fill the cavity in the tooth at the same sitting the pulp canal is filled, on account of the difficulty encountered in removing the amalgam filling should soreness supervene. At another sitting the tooth should be filled with great care, restoring contour and the cusps the same as with the permanent teeth.

*Pulpless Deciduous Molars.*—The treatment of these teeth is very similar to the treatment of the permanent ones. Children's teeth cannot be treated with as much certainty as those of an adult and the treatment therefore should always be tentative. We are amidst many difficulties when we attempt to preserve broken-down teeth for children, and we should spare no efforts to restore them to usefulness lest we are forced to extract, thereby causing the parent to reassert that it is folly to attempt to save a temporary tooth. The roots are small and divergent, the canals difficult to open, but this should be done as thoroughly as possible. Abscesses with fistulous openings should have several treatments, pumping the medicament through the fistula, then filling the canal with a solution of chloropercha and aristol, pumping it through the fistula, then packing the canal with gutta-percha. At a later sitting the tooth can be filled as heretofore described. We are never fully remunerated financially for saving deciduous teeth, but nature builded well and it is our duty to preserve her workmanship.

Discussion. *Dr. R. H. Jones,* Winston, N. C.: If there is one phase of dentistry that has been neglected by the profession it is the proper care of the temporary teeth. As the foundation of a building should be well laid, so the deciduous teeth should receive the greatest care as being the foundation of the permanent set. It is worth all we do and all we charge if we simply alleviate the pain, for these patients frequently come to us with an aching tooth which has cost them several nights of sleep. I would emphasize the feature of mastication, for who has not seen these little sufferers with nothing but a few stumps and shells with which to chew their food, which condition cannot help but impair their health? Too often parents do not realize the importance of keeping the first teeth in order that there shall be plenty of room for the second ones. They insist on the extraction of the deciduous teeth at the first symptom of pain, but we should never allow ourselves to be forced to extract these teeth for that cause.

As regards filling the temporary teeth, I do not agree with the essayist that copper amalgam is the ideal material. Gutta-percha is best in many cases, particularly in proximal cavities where decay has not progressed so far that you have to cut into the occluding surface. I have little confidence in cement fillings, as they must be looked after constantly and are treacherous, particularly near the

gum line. For the occluding surface tin or tin and gold are easily inserted, and if properly made the fillings will last as long as the teeth. One eminent member of the profession will not use amalgam because he says that where teeth are filled with it the roots are not properly absorbed.

I should like to emphasize the fact that by the extraction of the deciduous teeth irregularity is caused, especially of the front teeth in the permanent arch. The destruction of the temporary molars and cuspids by decay also brings about a very bad condition of the mouth and tends to injure the first permanent molars.

*Dr. L. P. Dotterer,* Charleston, S. C.: No subject can be of more importance than the preservation of the temporary teeth. I am not fond of it, but I think it should be a part of our education to learn to handle children. If we can gain their confidence and make them look upon us as their friends we can do almost anything with them. It is all well and good to talk about the mother scaring them, but we must recognize the fact as it presents itself. We should remember that the child has been suffering from toothache, and that his nerves are in no condition to permit of a lengthy operation. The greatest mistake is made in endeavoring to do everything at the first sitting, as it should be devoted to some palliative treatment and to gaining the confidence of the child. If our patients do not appreciate the importance of keeping these teeth I think the burden will lie upon the dental profession, and if we save the organs the parents are usually willing to pay the fee.

So far as filling materials are concerned, I have had no experience with copper amalgam, and I don't approve of gutta-percha because it swells after a time, spreading the tooth, and also wears down. I can recommend most heartily oxyphosphate of copper cement for filling children's teeth. It may be used on the grinding surface, but is especially efficacious in proximal cavities. It can be used in cavities where dryness is out of the question, and its wearing qualities are remarkable. With it I have filled the teeth of children two or three years old, and it has lasted for three or four years without further attention. The fillings that have been worn away by mastication have left the surfaces under them with a black deposit which is impervious to decay.

*Dr. D. D. Smith,* Philadelphia: From the standpoint of the profession at the present time this paper and the discussion on it seem

to be orthodox—right along the old line of letting the teeth go to ruin and then trying to save them. To save these deciduous teeth is an important office of dentistry, but we shall not accomplish this object until we change our methods. You may use any material, and may see the children as early as you please for filling, but there are many teeth that you cannot save by such treatment. A great deal of suffering may be relieved, but every dentist knows that perfect operations in children's mouths are almost impossible, and work upon the temporary teeth is passed over because of the attendant difficulties. Why do we not comprehend the causes of disease and decay in these and in all teeth and help nature to bring about better conditions? Prevent the breaking down and the building up will not be required.

We have not yet come to a correct understanding of what the teeth are intended for. The present emphasis is upon mastication, but they are not necessary to mastication. They are important for our comfort and it is quite worth our while to preserve them, but they are not necessary for the preservation of health. Neither tooth mastication nor mouth insalivation is a necessary process to health. If you or any medical man in this country had a patient whose life depended on assimilating nourishment you would not look to foods requiring mastication, but would give foods that could be taken into the stomach without mastication or insalivation, and in that way only could the patient's health be restored. Now, if we can restore health to the invalid without the aid of the teeth, why can we not in the same way maintain normal conditions in health? Comminution of food can be done quite as well out of the mouth as in it. Free and comfortable mastication contributes greatly to the pleasures of taste and ingestion, and to that extent favors stomach digestion, but mouth mastication is an office which can be delegated, as is often done, not only without injury, but with decided benefit. It is fallacious to think that insalivation is a necessary process. The fact that saliva in the initial stages of digestion converts starch into sugar may have been a matter of more consideration before sugar entered so largely into foods and drinks as at present. Now, with the constant oversupply of saccharines saliva, frequently vitiated and infected as it is poured into the mouth, a direct secretion by the salivary glands might in many mouth conditions give place to water in some form to advantage. We may

regard water not simply as a food adjuvant and a dilutant to the circulation, but as an integral part of nutrition, as necessary to digestion as to tissue replacement and to the maintenance of life. According to present teaching these ideas are heterodox, but it will not be long when they will be considered strictly orthodox.

I wish I could impress upon you not only the newer methods for preserving children's teeth, but also how to preserve the health and beauty of childhood. We must assist the development of the alveolar process for the proper and regular eruption of the permanent teeth, and facilitate the absorption of the roots of the temporary teeth so that they may be thrown off in the natural way. I began the prophylaxis treatment of which I would speak with my own grandchildren. Their mouth conditions were such at two years of age that I saw if the teeth were let alone there would be decay and suffering before three years of age. I began by removing the cause, which was in their mouths and on their teeth, and as they were my children I sought to make the operation a sort of frolic, being careful not to occasion pain in any way, but always to end the sitting with a clean mouth and clean teeth. Once a week the infection was polished off the labial surfaces of the teeth with the orange-wood stick and pumice stone, and at end of four weeks there was a wonderful improvement in the condition of the teeth. I was then encouraged to carry the good work on to all surfaces, but there were no instruments or appliances suited to the work. I finally found one of Jack's old porte polishers and with this was able to reach surfaces previously inaccessible. I extended the surfaces treated and kept on with the work of removing the infection—you may call it polishing if you choose—with the result that the children came to the period of shedding their temporary teeth with as good mouth conditions as could be imagined. The teeth were clear, translucent, living organs without even a suspicion of decay, and the roots were taken up and the crowns shed in their regular order without interference or even the application of a string. If time permitted I could give you the history of cases in practice even more convincing than these, cases where by this prophylaxis treatment there was an arrest of destructive caries already established, and a restoration and maintenance of general health conditions.

*Dr. J. P. Gray,* Nashville: Dr. Smith spoke of physicians giving easily assimilated foods in the treatment of diseases, but he forgot

to tell you that so soon as the patient recovers sufficiently the very best physicians will put him on a diet requiring mastication—on beef and other meats that should be taken into the stomach only after thorough mastication. I believe that mastication is absolutely necessary for health and that we should retain the teeth to aid the process. Dr. Smith's idea of treating children's teeth is a good one, and if we had them constantly under our care we could treat their teeth as he did and there would then be but little decay. That, however, is nothing more than the ordinary practitioner does. He removes the cause, but he does not have the children constantly at hand so that he can remove the accumulating affection, so the teeth decay. Let us remember that we are dealing to-day with people who are ignorant regarding the care of their teeth. The medical profession knows little about it, and I am sorry to say that even the dental profession does not know as much as it should regarding the care necessary for the preservation of children's teeth. We should impress upon parents the idea that children must be brought to us at or before the eruption of the temporary teeth, and if that is done there will be little trouble with the first set. It is not done, however, so the children are brought to us with their teeth badly broken down and there is nothing for us to do but treat them. It has long been a custom of the profession to charge little for children's work, but I think we should charge a good price and thus be able to take sufficient time to do the work well.

*Dr. Joseph Head,* Philadelphia: The care of children's teeth is of the utmost importance and I would second Dr. Smith's remark that our efforts should be in the direction of prophylaxis. The dental profession is in an atmosphere of prophylaxis, and ever since Miller and Black discovered that infection does not come from within the tooth, but from without, the profession has realized that decay can be prevented by cleanliness. It is evident that the greater number of cavities which form in the teeth of children between the ages of five and fifteen are due primarily to the fact that the teeth have not been kept clean, and that germs have been allowed to collect and erode the enamel to such an extent that it is never again normal. The mothers must be taught that each morning floss silk should be passed between every tooth in the child's mouth, and then followed with a brush and powder or a wash. If that is done few cavities will ever form, and those that do can be readily treated.

I do not at all agree with Dr. Smith's views regarding mastication and insalivation. For a quarter of a century Dr. Arthur said that the enamel between the teeth was unnecessary because it decayed, but after sacrificing thousands of teeth the profession found that God was right and Dr. Arthur was wrong. We should be very careful about accepting a statement that Divine Providence has made a mistake in creating certain organs. Did the Lord make a mistake or was he merely fooling when he put ptyalin into the saliva for the purpose of changing starch into sugar, in order that there might be some digestion in the mouth before the food reached the stomach? Zwieback is given for indigestion because it is hard and has to be chewed, and if mastication causes the food to be covered with saliva and thus makes it more easily swallowed you may be certain that it is done to fulfill a useful purpose.

*Dr. Richard Grady,* Annapolis, Md.: I think Dr. Smith's statement that the teeth are of no value for mastication and insalivation should be challenged, for it will not do for such teaching to go forth from this or any dental association. The London *Lancet* recently published four articles entitled "Observations on Mastication," and no one who read same could fail to be convinced of the importance of mastication in the process of digestion. I understood the essayist to say that if the temporary teeth were preserved throughout their life, the patient forming the habit of thorough mastication, that habit would continue if he should become edentulous in adult life. When one has attained full growth it may not matter much whether the food is masticated by natural or artificial means, providing it is properly done, but with children it is a different matter, and the state of our children's teeth is a question of national importance.

*Dr. Smith:* We all know of the Boston medical man who sets up the ridiculous claim that these teeth are disappearing because nature means that we shall not indulge in the same kinds of food later in life as in youth and early manhood. Who would dare assert that all adults must have the same kind of food or that all kinds require teeth for mastication? The teeth are a source of great comfort, and are useful, but not indispensable for mastication, but in most cases it would be a thousandfold better to lose all the natural teeth and depend entirely upon liquid foods for sustenance than to

carry perpetually in the mouth the awful infection which is found cemented to the surfaces of the teeth.

*Dr. A. C. Hewitt,* Chicago: Let me tell you of the horrible suggestion which was made by a professional man some forty years ago. He said that mothers suffered pain in labor because of the bony structure in the infant, and advised feeding the mother in such a way that the child's bones should be nothing more than gristle. His idea was to destroy the child merely to save the mother some pain, but if any mother loves her offspring she will not want to bring a child into the world without a backbone. We must feed the child through the mother if it is to have perfect teeth, and the proper time for us to exercise our skill and our care along the lines of dental hygiene is when the baby growth has begun. Nature put teeth into the child's mouth with the idea that he would prepare his food for his stomach by mastication, and when civilization has progressed so far that our food is so tender and so carefully prepared that we need no teeth for predigestion, then God pity us.

*Dr. M. L. Rhein,* New York: I claim that the simile used by Dr. Smith is absolutely false and erroneous. I never heard of a medical man prescribing predigested foods so that they could be to a certain extent assimilated by the stomach unless there were grave reasons therefor. Such methods are resorted to only when the patient's system is in such a debilitated condition that food cannot be introduced in the ordinary way. On the other hand, all the experience in therapeutics which we have had during the past few years has tended only to answer the question, "How long can a patient be kept alive on this kind of nourishment?" When you come to clinical experience in this matter there is probably no practitioner who cannot recollect cases where patients suffering from indigestion have had it controlled and cured merely by the supplying of proper prosthetic appliances so that by artificial means mastication could be performed as nature intended it should be. Such cases are amply sufficient to refute an empirical statement that has nothing to substantiate it.

*Dr. H. A. Smith,* Cincinnati: In the institution with which I am connected we have a large number of children from asylums, and we have complete control of their dentures from six to ten years. Little work is necessary for them, simply because they are brought to us regularly. All the trouble is overcome if we can

impress the managers of the asylums with the importance of letting us see the children's teeth every three months. We have instructed these children in oral hygiene for years, they are obliged to attend to their teeth, and the result is that the teeth have been improving all the time. The results are very different indeed as compared with an equal number of patients from the general public, for the latter children are brought to us only when suffering pain, and we cannot then do the right thing for them.

I believe that teeth are essential physiologically for mastication. It is commonly agreed that the preservation of the first teeth is essential to the proper development and preservation of the second set, but according to such an eminent authority as Charles Tomes this is not true. I should not like to advocate the opinion that the first teeth should not be preserved, but there are plenty of children who become edentulous at an early age and yet survive. The idea of feeding the mother is good to a certain extent and she should have good food all of the time, but we must not give too much attention to that feature from a dental point of view.

*Dr. D. D. Smith:* There has been a misconception of what I intended to say. If you will only look you can see on every hand illustrations of the fact that teeth are not necessary for mastication. The best conditions of health in old people are found among those who are without any natural teeth at all. Show me an old person and I will show you an individual practically without natural teeth. Many get along very well with one or two teeth in the upper jaw and hardly more in the lower, or vice versa, and maintain a species of mastication equivalent to ordinary mouth conditions. Although children may have poor teeth, they masticate practically as well as others and do not bolt their food as many suppose. My contention is that in many instances the stomach does its work very much better if the food is not mixed with the saliva. The man, woman or child that loses the natural teeth loses a vast amount of satisfaction and comfort—an invaluable thing, for there is nothing more valuable to the human system than a good set of teeth. I am trying to impress upon the dental profession that it should give humanity a set of regular, good and useful teeth. I am not contending that the teeth should be lightly thrown away, for they are rather to be made good and permanently saved.

*Dr. Hewitt:* I would ask Dr. Smith if he ever knew of an indi-

vidual ninety-five years of age or older who did not have his natural set of teeth?

*Dr. Smith:* I am glad of that question, although it would be more pertinent to ask how many people over sixty-five years of age I have known to retain their natural teeth and enjoy good health. The old people of to-day are generally without natural teeth, and the individual who lives beyond the age of seventy and retains any considerable number of them is the conspicuous exception. Twelve years ago one of the richest men in Philadelphia was supposed to be on his death bed. Like many another man he had suffered all his life from slow systemic poisoning due to the infection perpetually on the surfaces of his natural teeth. Through a period of seventy years the gradual accumulation of septic matter had never ceased nor had it been removed. The supporting structures had gradually given way and been absorbed, leaving a constantly increasing tooth surface exposed to infection. Tooth after tooth had been lost until the number had been reduced to about twelve, and they were so loose as to be a hindrance rather than an aid to mastication. Furthermore, they presented conditions and surfaces which made cleansing impossible, and there was enough virulent infection on a single one of them to poison his whole system. They were removed, and the result was that he got up from his bed and is now at ninety-two years of age a monument of health and vigor. He goes daily to his office and manages a large business.

*Dr. Vann,* closing discussion: God speed the day when we shall have all mothers educated so that children's teeth will be looked after in infancy. We may tell a man not to go along a certain thoroughfare, but as surgeons we shall have to set his leg if he falls and breaks it. However, we are gradually educating people in the right direction. The reason that the edentulous old people have good health is because they chewed their food thoroughly when they had temporary teeth, and if you now give them an old hard crust of bread they will not swallow it before it is thoroughly softened in the saliva. Deprive a child of his teeth and you will see him strain and stretch his neck to get his food down.

# SOMETHING OR OTHER ABOUT CHEMISTRY.

BY D. R. STUBBLEFIELD, D.D.S., NASHVILLE, TENN. READ BEFORE THE SOUTHERN BRANCH OF THE NATIONAL DENTAL ASSOCIATION, AT WASHINGTON, FEBRUARY 23-26, 1904.

Our very industrious and truly zealous President thus paraphrased a request or demand upon us. Of course there could not be any real ambiguity as to his meaning, but his statement gave such a broad opportunity that the temptation could not be resisted. It is not often that a man has a chance to make a speech upon a topic so large that no matter what he says he cannot get off the subject. Another and a real reason for seizing such an opportunity or such a subject is that we do not wish anyone to suppose for a moment that this will be a serious attempt to present something new in connection with chemistry. This will be no discussion abounding in chemical formulæ and technicalities, the kind that only the author understands and only a corporal's guard beside him appreciates enough to listen to clear through to the end. We have too much respect for the science of chemistry to masquerade as one of her true votaries. What we shall undertake is to give some plain convictions that grew up in our mind during the seventeen years of efforts to teach the merest rudimentary principles that underlie the science of chemistry.

We are convinced that students accept chemistry as the little boy takes castor oil—one hand of his mother on his nose and the other at the nape of his neck, while the assistant takes advantage of the first opportunity to get well into his mouth. There is no love lost between dental students and chemistry. The student who loves chemistry and finds some pleasure in its study is, like the traditional hen's tooth, "skace." Why is this? There must be some cause for such an incontestable effect as this. All through the years we have personally suffered from this effect and have wondered what was the cause behind it. This is the first coherent effort to fathom the mystery. In our opinion the whole trouble lies in the fact that the course in chemistry in our dental schools has been too superficial and too brief to produce more than a puzzling partial knowledge, which has long been denominated a dangerous thing. Chemistry is known to be an experimental science, not to be worked out by the reason, but to be known only by absolute

experiment. Experiments take time and repeated efforts, and anything like a get-knowledge-quick scheme is an unheard-of, not to say unthought-of, idea in this world of reactionary affinities where proof is the only passport. Such is the intensely practical nature of our branch of the healing art that until now the schools have been unable to set aside enough time to do this work properly.

The result has been upon the whole a hollow mockery, depending for its greater or less grotesqueness upon the individual judgment exhibited by each teacher. If the instructor recognized the absolute futility of trying to make enough headway into the science to engender a love for its real worth, and satisfied himself in trying to make familiar the simplest conception of its A B C's, he most likely hit what he aimed at. Familiar with such fundamentals the students thought themselves informed in chemistry, and gained a self-poise that goes far in the effect produced by any man upon his professional brothers and the public at large. On the other hand, if the teacher seriously set to work to teach chemistry to the class his task was too large for his time limit, and the food was too rich for the weak digestion of the minds before him. He rarely succeeded in opening the eyes of a single student to the beauties of his branch, and he and his remained a thorn in the flesh to the generations of students as they ran.

What the practical outcome has been some of you are doubtless well aware, and are willing to testify that better results might have been more desirable to the profession. You must admit, if you have thought deeply regarding it, that the limitations from one cause and another which have constantly hampered this work make it plain that the doing of even so much was quite an achievement. It must be taken as an earnest of what might have been done.

This brings up the question that has been frequently asked: What is the use of my studying chemistry? Is the game worth the candle? Is a half-loaf better than no bread? We are one of those who believe that nothing is too sacred to be investigated and that the truth is able to withstand the most searching scrutiny. Have the efforts of the past repaid the investment of labor in cultural value? What do you think? The question has two sides and you certainly believe one or the other. To bring the question before you, as the parliamentarians are fond of saying, we wish to say that we believe all honest effort has been repaid by the results attained.

From the standpoint of chemistry, pure and simple, we do not believe much has been done, but the general cultural uplift and the practical worth of the facts obtained from chemical philosophy have been worth more than the labor expended. In this we are estimating the result on its lowest level, yet we believe the information incidentally acquired has enriched the minds of students, making them more enlightened citizens than they would have been without it, and whatever elevates the man tends to improve the professional man, and he is always expected to be a little better informed than the average member of the community. Again, it is difficult, if not impossible, to tell just what impetus is given to the mind by each individual study, much as it is impossible to know what special article of food gave the energy to mind or muscle in a general dietary, but the aggregate effect is there and that is what we are after.

Besides this intangible and almost spiritual effect which cultural studies have upon the mind, there is a distinct addition to practical knowledge in the many plain, everyday common facts that may be obtained. It is something to know, for instance, that this complex universe of ours may be simplified into a few forms of elemental matter set forth in the table of elements, and a firm grasp of that fact renders us almost indifferent to the suggestion that right now the elements of the past may soon be proved to be compounds. We have something to stand on, clearly defined in our comprehension, and we confidently await any results of later experiment, willing to accept additions or subtractions with an even mind.

Again, the chapter on water alone contains enough compensation to pay for more time and labor than the average man has bestowed upon this study. We believe it is worth much to know that water, the only exception to the law that all matter expands when heated, gives more to the world than any other one compound. It used to be said that the general advancement and progressiveness of any country were measured by the amount of sulphuric acid it consumed in its affairs, but we wish to call your attention to the fact that the culture and enlightenment of any people are to be measured in this day and time by the intelligent use and quantity of water consumed. Its great abundance outside of us, covering three-quarters of the earth's surface, is paralleled by its abundance within the animal and vegetable worlds. Its importance to both cannot be overestimated,

for its presence is indispensable. That exceptional property of contracting instead of expanding from 32° to 39 1-5° F. makes the difference between inhabitability and uninhabitability of this world of ours. Ice floats because it is one-tenth expanded, but if it were not for the fact cited above freezing would go to the bottom of all bodies of water and Summer suns would not be any more able to melt them than they are the century-old glaciers that fill the valleys of some parts of the world. That would bring death-dealing dreariness.

But we must desist. This paper would go to an extent incompatible with time and place to tell the catalogue of excellent facts worth knowing which are to be derived only from a study of chemistry. These examples illustrate the statement that many practical truths may be obtained from chemistry which will make its study worth while to any man, especially to the professional man. It seems like trying to prove the truth of an axiom to attempt to prove the importance of a study of chemistry in making the best preparation for our profession, when the usual occupation of the dentist is repairing the ravages of a chemical agent upon the teeth. Therefore we conclude with a repetition of the plea for more time and more work in chemistry to be demanded on the part of those who make the colleges and the rank and file of the profession all over our great land.

Discussion. *Dr. W. V-B. Ames,* Chicago: It has been a matter of regret to me to realize that chemistry is usually placed before dental students in such an unattractive manner, for if they do not become interested in the subject while at school they never will. The study of chemistry is very apt to appear to the dental student as the study of Greek and Latin does to the average youth. Unfortunately they came to be called "dead languages," and boys would study them as dead languages and with a very meager interest. If the youths of this land could be impressed with the usefulness of the so-called dead languages to them in all walks of life, and especially in social intercourse and literary pursuits, they would take up the study of them with just as much vim as they do other subjects. In the same way, if the study of chemistry could be placed before the dental student in the light of being of much use to him in practice, as it necessarily must be, he would certainly take a greater interest and it would not be such a dead subject to him. It is a mat-

ter of regret to me that so often chemistry is taught by a man who knows nothing whatever of dentistry, and who consequently does not make the subject live and interesting to the students by giving practical illustrations, showing where each item of chemical study may be applied by the practicing dentist.

*Dr. R. H. Jones,* Winston, N. C.: The ideas set forth by Dr. Stubblefield are worthy of our serious consideration, for as dentists we do not realize the great importance of a proper knowledge of chemistry if a man is to be a successful practitioner.

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## ORAL HYGIENE.—REPORT OF THE COMMITTEE.

BY J. E. CHACE, D.D.S., OCALA, FLA. READ BEFORE THE SOUTHERN BRANCH OF THE NATIONAL DENTAL ASSOCIATION, AT WASHINGTON, FEBRUARY 23-26, 1904.

As to the breadth of field involved in the term oral hygiene, it is believed that few of us realize the extent to which it ramifies throughout almost every question relating to dentistry. All branches and phases of our work have their bearing on the health of the oral cavity, and through that cavity on the health of the entire body. As is implied in the foregoing sentence, oral hygiene is itself but a small division of general hygiene, and the dividing line between them is necessarily indistinct and illy defined, for it is impossible to treat of the health of one organ or part, as distinct from that of the organism in general, existing as there does such an interdependence between all the parts. Your chairman makes these remarks in part as an apology for what may be criticised as the bringing into this report of matter irrelevant to a report of the Section on Oral Hygiene.

It is our pleasure to report that the past two years have been unprecedented in the activity of our profession along the lines of oral hygiene. Never before has the importance of prophylaxis been so thoroughly appreciated by the profession; never before have questions relating thereto been so frequently and thoroughly discussed before our societies; never before has the operation of cleaning the teeth, with its accompaniments, been so faithfully carried out at the chair. Not that conditions are as we might desire them, but the present activity is certainly a most important index, point-

ing with no uncertain meaning to greater things in the future, and possibly at no distant time to such a perfection in the ways and means of preventive dentistry that all those who place themselves in competent hands and conscientiously carry out instructions will be freed from dental caries and those often greater evils which follow septic conditions of the mouth.

Our profession in particular and the public in general owes an undying debt of gratitude to those men who are devoting themselves to this great work. That we have men in our profession who are proving themselves equal to the task, when necessary, of cutting new paths in the field of general pathology and etiology, is in itself a commentary on the present status of dentistry, as is the wideawake state of so many of the profession as regards the scientific aspect of those conditions with which they are called on to grapple.

For the purpose of classification, and thus facilitating the consideration of this report, we have divided it into the following heads—*First.* Oral hygiene as affected by etiological factors. *Second.* The unhygienic mouth as bearing on systemic infection. *Third.* Oral hygiene and prophylaxis as an operative measure. *Fourth.* Miscellaneous questions relating to oral hygiene, not considered under the foregoing heads.

*First. Oral hygiene as affected by etiological factors.*—We take it as a truism that the last chapter on oral hygiene cannot be written until all questions relating to the etiology of caries, pyorrhea, and the other diseases to which the oral cavity is subject are settled and placed on a fixed scientific basis. It is also true that each step toward a better understanding of the etiology of these diseases places us that much nearer the goal of preventive dentistry. Until these causes, both active and predisposing, are understood, we must work more or less empirically, and a national theory of prophylaxis cannot obtain. Our advance during the past year in etiology has been both constructive and destructive. Constructive in the addition of new facts, and destructive in the overthrowing of conclusions which had been based on insufficient data. The researches of Kirk might be classified under the first head, those of Miller principally under the second.

In Kirk's paper on "The Predisposing Factor in Dental Caries" (DIGEST, August, 1903, p. 968) we have an able appeal for the consideration of the importance of the constitutional factor in im-

munity and susceptibility to dental caries. In pointing out the failure of our prophylactic treatment as now practiced he says, "All the minutiæ of the dental toilet, the cleaning of the tooth surfaces and the buccal mucosa, and the application of buccal antiseptics, etc., are effective only in proportion to the persistence with which they are exercised, while the persistence of bacterial influences is practically a constant factor. Eventually the constant factor must produce its results when combated by the necessarily intermittent one of local hygiene and antiseptics. We must then seek some method of prevention equally as persistent as the bacterial influences." Further he says, "The conditions which in a strict sense produce susceptibility to dental caries are but little known, while those which enter into the problem of immunity are still less understood. Certain results, however, have been obtained which are at least significant that the composition of the saliva exerts a most important influence upon the causation of caries." The important conclusion is reached, through experimental research on the mixed human saliva by means of the micropolariscope, that all cavities found in the teeth are not the result of the action of microorganisms, but that in many cases where there is a rapid dissolution of tooth structure the effect is produced by the action of sodium acid phosphate, which is contained in the saliva probably as a result of faulty metabolism. Thus we have a corroboration by exact methods of research of the prediction of Michaels in 1900.

In another paper by the same author on "The Saliva as an Index of Faulty Metabolism" (DIGEST, September, 1903, p. 1126) we have a report of experiments and conclusions drawn therefrom relative to the condition of faulty metabolism as an etiological factor in certain oral lesions, such as dental erosion, pyorrhea, probably dental caries, etc. This field of research promises great things in the way of clearing up our ideas of etiology, and Kirk has here shown us how the hyperacid diathesis acts in producing that form of erosion which manifests itself in localized erosions upon certain surfaces of the teeth, and which has long been recognized as due to the abnormal acid secretion of certain mucous glands. The paper is concluded with a statement, the truth of which is beginning to be recognized, namely, that good health is the best guarantee against bacterial invasion, and that it is faulty nutrition which is mainly the prodromal condition of infection. The building up of the natural

body defenses by establishing conditions of nutrition is not only the true prophylaxis, but it is very evidently the only rational basis of therapeutics.

In a third paper, entitled "A Contribution to the Study of Metabolism" (DIGEST, December, 1903, p. 1488), is reported the discovery, by means of the micropolariscope, of oxalic acid as sodium oxalate in the urine in the earlier stages of oxaluria. Kirk believes that this salt always appears in the earlier stages of those cases, the advanced stages of which are characterized by the appearance of oxalate of calcium in association with other phenomena indicating a faulty metabolism. Lactic acid in combination as calcium lactophosphate and calcium lactate was also found in two cases of typical malnutrition. Kirk says that, "These faults of metabolism are productive of lowered vitality in two ways—first, by depriving the organism of that benefit which results from the normal nutritional process, and, second, by producing toxic waste products which accumulate in the blood and still further depress the vital resistance of the cellular elements, creating thereby a vicious nutritional circle. It is these two factors—tissue starvation and autoinfection—which seem sufficient to account for the lowered vital tone which renders the individual vulnerable to the invasion of those disease-producing bacteria which under normal conditions of nutrition are for the most part harmless."

In the *International* for June is given a review of a paper by Dr. Michaels on "Saliva as a Natural Protection Against Caries." The position is here taken that the saliva exerts a protective influence in three ways—First, mechanically, in that it washes away injurious substances; second, by neutralizing and diluting acids produced in the mouth; and third, by the antifermentative action of the sulfocyanid of potassium contained therein. As a result of analyses of the saliva, this author claims it is proved that where there is an increased amount of carbonates, phosphates and calcium in the saliva there is less caries of the teeth than where the saliva contains less of these substances which establish its alkalinity. He claims it is further established that persons suffering from neurasthenia and anemia have no sulfocyanic acid in their saliva, and it is well known to what an extent these patients suffer from caries. The use of tobacco is said to produce an increase of sulfocyanic acid in the saliva, and thus we find a reason other than its antiseptic action,

which was established by Miller, showing how tobacco tends to lessen caries. The author also holds that it is possible to increase the amount of sulfocyanic acid by internal medication and thus attack caries through systemic prophylaxis.

Miller has presented us with three very important papers during the year on the question of immunity (DIGEST, June, 1903, p. 708). They represent a great deal of work, being a record of extended experimentation. Coming from such a quarter these investigations carry with them much weight, and his conclusions being in direct opposition to those arrived at by others adds importance to their consideration. His conclusions are: 1st. The mixed human saliva, whether filtered or unfiltered, in its normal state or condensed by evaporation over water bath or at the temperature of the human body, does not possess the power to prevent or retard processes of putrefaction or fermentation. 2nd. Potassium sulfocyanid does not possess any appreciable antiseptic action in the greatest strength in which it is found in the human mouth. 3rd. Growths of bacteria and fermentative and putrefactive processes take place in oral mucus quite as readily if not more so than in the mixed saliva of the same person. 4th. The saliva of immunes develops in the presence of carbohydrates a little less acid on the average than that of highly susceptible persons. The difference is, however, not constant and not sufficiently marked to account for the great differences of susceptibility. 5th. Free acids produced by fermentation make their appearance in strongly alkaline saliva (as that of the horse) much later than in human saliva. 6th. The protective bodies (alexins) of the blood do not under normal conditions pass into the saliva in sufficient quantities to be detected by ordinary means. 7th. The struggle for existence probably plays an important role in protecting the mouth and the organism in general against the invasion of pathogenic microorganisms. 8th. Bacterial plaques are not essential either to the beginning or to the progress of caries, nor does their presence necessarily result in the production of caries. It is possible that they may intensify processes of decomposition in particles of food clinging to the surfaces of the teeth. 9th. The protective powers present in the human mouth are not to be accounted for by any antiseptic action on the part of saliva, but rather by the phenomenon of phagocytosis, by the struggle for existence, and probably by certain forces residing in the soft tissues which have

not yet been investigated. 10th. Viscid, stringy saliva appears to exert an influence on immunity largely or wholly through its effects on the self-cleansing process. 11th. There is no fermentable carbohydrate naturally in the saliva under normal conditions in sufficient quantity to materially influence the origin or progress of caries.

*Second. The unhygienic mouth as bearing on systemic infection.* —Like other questions relating to oral hygiene, this phase of preventive dentistry is growing in importance as the facts connected therewith become better known, and they are being clearly and forcibly brought to the attention of both the medical and dental professions by such men as Dr. D. D. Smith, Dr. Samuel A. Hopkins, and others, and with these champions such a cause cannot long remain in the background.

Dr. Smith in reading his paper on "Systemic Infection Due to Natural Teeth Conditions" (DIGEST, April, 1903, p. 397) has placed society very much in his debt for showing up that veritable cesspool, the unclean human mouth, in its true light as a causative factor in systemic infection. The matter in this paper is considered in general from the standpoint of the clinician and will no doubt do much good. We agree with Dr. Smith that a full recognition by the medical fraternity of the dangers which lurk in septic conditions of the mouth will do much toward a betterment of same.

Dr. Hopkins in his paper on "The Medical Aspect of Dental Lesions" (DIGEST, November, 1903, p. 1343) has made a notable contribution to the literature of the subject. It is an able appeal for greater consideration of the neglected field of constitutional disturbances due to septic conditions of the mouth, followed by a report of extended laboratory research on three of the most important pathogenic bacteria of the human mouth—staphylococcus pyogenes aureus, micrococcus tetragenus, and micrococcus lanceolatus. This article is full of important points, but we would call particular attention to the results of the experiments with the microorganism of pneumonia. It was found that mouth cleanliness would cause a disappearance of this microbe in many cases, and prophylactic treatment, when it did not destroy the microbe, would render the saliva which contained it non-pathogenic. To use his words, "We have then in mouth cleanliness a most important factor in preventive medicine, and it can be asserted with a degree of positiveness that is fully borne out by experiments and by clinical experience that this

disease might be almost eliminated from human ills were it possible to keep the mouth in a clean, healthy condition."

Miller says, "Apart from the many local diseases of the mouth and teeth and their various sequences, the oral cavity serves as the port of entry for bacteria of a long list of the most fatal diseases to which the body is subject," and mentions among these, tuberculosis, pneumonia, cholera, typhus, etc. It has been only a short time since the publication of the work by William Hunter on "Oral Sepsis as a Cause of Septic Gastritis, Toxic Neuritis, and Other Septic Conditions." This shows that the medical profession is waking up to an appreciation of this danger, and with them as friendly, appreciative allies we may reasonably hope that the demand by the public for prophylactic treatment will assume greater and greater proportions.

*Third. Oral hygiene and prophylaxis as an operative measure.*—The one notable addition to this phase of the subject during the year is that presented by Dr. L. C. Bryan of Basle, Switzerland (DIGEST, January, 1904, p. 79). He advocates the use of nitrate of silver in forty per cent solution, to be applied to all of the surfaces of all the teeth after drying them. The stain is then removed with iodin and all surfaces thoroughly polished. This treatment is repeated every six or twelve months, according to the susceptibility of the patient, whether there are any defects or not. This leaves a deposit of iodid of silver, which is a yellow, insoluble antiseptic powder, in the superficial parts of all fissures and crevices, while the nitrate, which penetrates more deeply, is left in the bottom. We are cautioned against its use about front teeth with porcelain or leaky gold fillings on account of the discolored joint produced. Dr. Bryan finds that the teeth take on a denser appearance after the treatment, and he believes that the nitrate of silver bath stimulates the tooth-building cells to new activity. This Dr. Miller and others doubt. However this may be, Dr. Bryan's report of the clinical results are certainly most encouraging.

*Miscellaneous.*—Dr. Harlan in a paper on the "Drug Aspect of Lesions of the Gums" calls our attention to the great evil which naturally follows to the teeth and gums from the use of the finely-comminuted, premasticated breakfast and luncheon foods. He says that if we are to keep our teeth in number and form and health they must do their share of the work of the body to justify their place in the organism. When the use of these foods is largely indulged in

the gums should be rubbed in some manner to insure perfect circulation and health. Dr. Smith's vigorous rubbing of the teeth with pumice and stick would certainly fill a great need in these cases.

Dr. C. M. Wright calls attention to the mistake of throwing the responsibility of oral prophylaxis upon the patient, with his unskillful use of the brush and his liberal use of mouth washes and dentifrices, and insists on frequent visits to the dentist. The results obtained for their employes by the Diamond Match Co. by frequent and systematic prophylaxis is cited as evidence of its importance.

Dr. M. L. Rhein in two papers on "The Trained Dental Nurse" gives us what seems to be a practical solution of a difficult problem. The importance of prophylaxis is dealt with and reasons are given why this phase of dental practice is ordinarily neglected, among the most important of which is the fact that the dentist with an average practice has his time taken up in repairing the ravages of decay and has little time left for its prevention. The idea of the dental nurse trained specially in a department of the training schools for nurses, and carrying out the prophylaxis treatment under the direction or prescription of the dentist, is certainly worthy of careful consideration. It has been very favorably received, and in many quarters is being put into practice with good results.

Dr. Richard Grady in a paper on oral hygiene for the school boy and girl pleads strongly for the introduction into the textbooks of our school children of suitable instruction on oral hygiene. We believe this to be the proper solution of the question, rather than the introduction of a textbook devoted entirely to oral hygiene, as is advocated by many. Nothing can be permanently gained by emphasizing the importance of a subject out of its true relative position. Oral hygiene is a very important branch of general hygiene, and as such it should have full treatment in the textbooks on physiology and hygiene. We believe with Doctor Grady, that "When we get into the textbook what we want the children taught in oral hygiene half the work will have been accomplished."

Discussion. *Dr. M. L. Rhein,* New York: Dr. Chace has given us an excellent report, and so large a field is covered therein that it is almost impossible to discuss it without going into much detail. Personally I do not entirely agree with some of Dr. Miller's conclusions, and think that in some respects he has been rather dogmatic. This question of immunity and susceptibility is in such

an experimental state at the present time that we are not warranted in finally accepting the conclusions offered, especially as Dr. Miller's views differ from the clinical observations of many men who accept all the scientific experiments that he has performed.

*Dr. E. P. Beadles,* Danville, Va.: The point was made that tobacco preserves the teeth to a certain extent, but nothing was said as to what form it was in. I would ask Dr. Chace whether he considers tobacco beneficial or injurious.

*Dr. Chace:* I am unwilling to answer that question definitely, as there is a moral consideration involved, but ordinarily I believe that chewing is beneficial. Miller's investigations referred to the use of tobacco smoke to destroy bacteria, and the investigations referred to by Dr. McCall showed that the use of tobacco increased the sulphocyanid in the saliva, but the effect on caries might be entirely different from its effect on lesions of the gums. We know that smoking increases tartar, and it therefore might have a bad effect on the gums even if it did inhibit caries.

*Dr. Beadles:* As regards the use of nitrate of silver, the more I employ it the stronger my faith becomes in it. Frequently where I did not wish to extract the third molars I have used a strong solution in the cavity and then filled the latter with gutta-percha, especially where there was no occlusion and in children's teeth. In my own little girl the central incisors, although a little blackened, were preserved until ready to be shed, and I have frequently saved deciduous teeth by the use of this agent.

*Dr. J. H. Crossland,* Montgomery, Ala.: The organs of the human body that contribute most by their functioning to their own health and that of the whole system are the teeth. In common with other organs they cry out to Nature for use and cannot be healthy without it, and the other organs cannot be healthy without them. The teeth of the tobacco-chewer are generally the best that we meet, all things considered. They may be stained, but decay will progress slower in them than in any other teeth.

*Dr. R. H. Jones,* Winston, N. C.: Dr. Crossland has overlooked one great evil caused by chewing tobacco. I have practised for several years in a tobacco country, and from careful observation believe any advantages of chewing are greatly overbalanced by the wearing away of the teeth.

*A Member:* Do you chew?

*Dr. Jones:* No, sir; and I certainly would not do it to clean my teeth. Tobacco may possibly retard the growth of bacteria and thus prevent decay to a certain extent, but it has many disadvantages and I believe it is a mistake to advise people to use it indiscriminately.

*Dr. W. G. Mason,* Tampa, Fla.: I come from a region where many smoke and few chew, and it is rare to find a smoker who has not very bad gums, although his teeth may not be injured.

*Dr. Rhein:* I think Dr. Crossland has overlooked an important point. The constant chewing of tobacco brings about an excessive flow of the various secretions that make up the oral fluid—not the saliva alone, but the entire contents of the mouth. This constant excitement of the salivary glands, which are important attendants upon the act of digestion, is followed by a vitiation of the power of those glands, because no such function can be kept up all day and have a healthy state continue. Clinical experience has demonstrated to me that the habit of chewing gum interferes with digestion if carried on to a considerable extent, and I believe the same is true of the habitual chewing of tobacco. I think that it also tends to hurt the soft tissues around the roots of the teeth just as excessive smoking does, and one will do as much harm to the soft parts as the other. I believe that the moderate use of tobacco is beneficial, but I think that if used to excess in either smoking or chewing it is very harmful.

*Dr. B. Holly Smith,* Baltimore: This assumption of the harmfulness of tobacco is certainly along the line of oral hygiene, and Dr. Rhein has in a very temperate way approached the subject. I believe that if we did not chew nor smoke we would be better off, but I don't believe any moderate user of this seductive and pleasurable narcotic will admit that it is harmful.

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## VALUE OF SYMMETRY IN EDUCATION AND CHARACTER.

BY GEORGE F. EAMES, M.D., BOSTON, MASS. CHAIRMAN'S ADDRESS BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, JUNE, 1904.

In the contemplation of any subject, be it animate or inanimate, the pleasure and satisfaction derived therefrom is dependent in a great degree on its symmetrical proportions; indeed, asymmetry as

seen in many objects and especially in the human form is a positive disfigurement and is often repulsive. But symmetry as I wish to discuss it will be considered in connection with the mind and soul. It will be noted at once that lack of symmetry in the mind is not so readily observed as a similar condition of the body, although it is vastly more common, and the deviations from what might be considered typical in the former would be altogether hideous if the same disproportion were exhibited in the physical system. Imagine a nose which by a slight aberration of development has continued to grow until it is twelve inches long, or one eye eight inches in diameter and the other a mere pinhole! Such an extreme in physical deformity has probably never been known, yet similar disproportions or greater may easily be conceived to exist in the different powers of the mind.

In the dental profession we should not expect to find excessive abnormalities or great deficiencies in intellect, but there are many indications that the majority of practitioners might develop their mechanical and intellectual powers in certain directions with great benefit to themselves and patients, and everlasting good to all people over whom they have any influence. This means that there are many defects in symmetry to be observed among dentists and even among stomatologists. While some defects may be found in the best of men, those which we have now under consideration are such that in many instances they ruin the man as a practitioner, and in nearly all the other cases mar his brilliancy and seriously handicap his professional progress.

Take, for example, the life of the late P. D. Armour, the great capitalist of Chicago. His strict devotion to business, at the expense of all social life and entertainment, and his abstemious habits were still kept up even after his financial worth was counted by millions. While his business ability was increasing, other faculties of mind and heart were weakening, and when this hypertrophic condition, in the shape of an enormously enlarged business capacity, became pathologic, and the discrepancy between this and other bodily and mental functions became so great that he began to suffer from the strain, he was urged to rest and go to Europe. He went, but he had lost all capacity for the enjoyment of travel and change of scene, and he died in the harness which he had himself constructed.

The following quotation from Charles Robert Darwin shows still further the effect of asymmetrical development: "I have said that in one respect my mind has changed during the last twenty or thirty years. Up to the age of thirty or beyond poetry of many kinds, such as the works of Milton, Gray, Byron, Wordsworth, Coleridge, and Shelly, gave me great pleasure, and even as a schoolboy I took great delight in Shakespeare, especially in the historical plays. I have also said that formerly pictures gave me considerable pleasure, and music very great delight. But now for many years I cannot endure to read a line of poetry. I have tried lately to read Shakespeare, and found it so intolerably dull that it nauseated me. I have also almost lost my taste for pictures or music. . . . This curious and lamentable loss of the higher esthetic tastes is all the odder, as books on history, biographies and travels (independently of any scientific facts which they may contain), and essays on all sorts of subjects, interest me as much as ever they did. . . . Why this should have caused the atrophy of that part of the brain alone on which the higher tastes depend I cannot conceive. . . . If I had to live my life over again I would make it a rule to read some poetry and listen to some music at least once every week, for perhaps the parts of my brain now atrophied would have thus been kept active through use. The loss of these tastes is a loss of happiness, and may possibly be injurious to the intellect, and more probably to the moral character, by enfeebling the emotional part of our nature."

Professor Charles Eliot Norton says, "Whatever your occupation may be, and however crowded your hours with affairs, do not fail to secure at least a few minutes every day for refreshment of your inner life with a bit of poetry."

A few weeks ago I met a physician in the suburbs of Boston. He was apparently taking a walk for pleasure, and was observing some birds by the way. My first thought was one of surprise that this physician in full practice, the author of a large work, and in many ways one who must meet numerous demands, could and would find time for such a purpose, but a moment's reflection convinced me that such use of time was very wise and judicious—that it was necessary, not alone for diversion and recreation, but that it served to cultivate the mind, to broaden the view, and to render more sensitive and acute the artistic and moral sense. In many other ways a study of the lower animals increases by comparison our

knowledge of the higher, and this is, as we well know, of essential value to the physician. It is a grave mistake to neglect the cultivation of the artistic and esthetic sides of our nature, of a love of the beautiful, of sympathetic feelings and of all that is delicate and refined, whether one is fitting to become a physician, a general or a special surgeon.

Away with the idea that the surgeon needs no feelings of delicacy and sympathy; that, devoid of all sense of feeling, he cuts across nerve and artery, or that he administers an anesthetic which suspends nearly all the functions of life, without giving a thought to the real condition in which he places his patient—without feeling the full weight of responsibility in holding a precious life in his hands! It is true that a surgeon should not allow his feelings—his emotions—to be uppermost when he is performing an operation. To all appearance he must be devoid of sensibility and even sympathy—yet the world knows that the greatest delicacy of perception, the keenest appreciation of possible pain are a part of his equipment, and that it is only the well-being of the patient which demands apparent indifference to suffering. If he cannot, for the time at least, lock up his "feelings" so that they will disturb neither his patient nor himself, he loses something of his dexterity and physical poise. But sensitiveness—mental as well as physical—is a very important characteristic of a great physician, and this same sensitiveness is cultivated or lessened, as the case may be, by a man's daily living and his attitude towards life. He may harden and blunt his perceptions as he may, dull his tools if he will, but good work demands the keenest edge of which he is capable.

The practical and important issue before us, in view of the conditions to which reference has just been made, is this: What are the more important defects in our professional life, and what are the remedies? The first consideration in seeking to correct a diseased or any undesirable condition is to discover the cause, and here it is to be sought in the early years of child-life, although, indeed, causes may exist generations before. Manifestly the suitable preparation of body and mind for the duties of life may be included in the broad term, education. Asymmetry due to lack of development, then, of the body or mind is due to faulty education. Many of our college graduates are like statues carved to be placed in a frieze. The side towards the public gaze defies criticism, but the rest is of rough, unhewn stone.

It is evident that life is too short to pursue studies in every direction available at the present time, and a choice must therefore be made. On this choice may hang future success or failure, and to it we may look for the cause of many deficiencies in development of both body and mind. The writer believes that much is taught in all departments of education which has no vital and practical value in the life work to come. With innumerable subjects for study, with the many subdivisions of these subjects and the almost unlimited extent to which they may be pursued, the great need is shown of weeding out, and also the serious difficulty of doing so. Everything which is taught at the present time has a certain value, and one reluctantly strikes out of the list anything which is worth while, but it is a choice between greater and lesser values. From early childhood it should become a matter for serious consideration, not only as to what shall be taught, but also as to what needs curbing, and what should be strengthened. Mere intellect, as some one has said, is as hard-hearted and as heart-hardening as mere sense. We need to remember this in our schemes of education. A little child, instead of being confined in a room for hours, where he is taught the alphabet or spelling, would be far better off were he out in the fresh air and sunlight, becoming familiar with the colors and flowers and the facts of nature.

Later in life, in the preparatory schools, no one will question that mathematics is an essential item in the curriculum, yet even here we may make an improvement in the old methods by substituting something more useful and practical for the higher mathematics, leaving these until later or until the life work is chosen. The writer has in his school days spent much time over mathematical problems or catch-traps which had no value beyond the discipline and exercise which they gave the mind, and he believes that something else might have been substituted which would have given the necessary discipline and exercise, and at the same time would have educated him in a useful and practical way. On the other hand, overindulgent parents and unthinking teachers may allow a child to follow his bent too closely, and the very danger is precipitated which we wish to avoid. In order to produce a symmetrical figure the pedestal or foundation must be strong and well-rounded, so that however elaborate the decoration of the capital or head of the column may be there shall be no incongruity be-

tween it and its base. A school course which fitly trained mind, heart and body in the right degree would be the ideal one.

It would seem a wise procedure if exercises were introduced at an early age with the object of ascertaining the prominent characteristics inherent in each child; for instance, even in kindergarten life a talent or the ability to do one thing better than another is often shown, as are the inventive and constructive powers. Equal attention should of course be given to finding out and strengthening weak points. This if systematically carried out during school life, and a record made and kept for future reference, would be valuable. For example, a young man, with the help of his friends, wishes to determine in what direction his life work shall be. In coming to this decision he considers not only what he thinks he should like to do, what he is most interested in, and how he could obtain the most money, but he should by no means neglect to take into consideration the direction in which his greatest talents lie, the things which he has done with the most marked ability, the work which by nature he is best adapted to do. For this purpose recourse may be had to his school record, which is on file at the schools which he has attended. This record will show from child life up the individual's proficiency in drawing and other work which shows artistic ability, also his aptness in a mechanical and manipulative way. The inventive powers are often shown even in kindergarten life in the various shapes and ways in which blocks may be arranged, etc.

These and other items of the student's school record should be of great assistance in the choice of a vocation. To take up the life work to which one is best adapted means the greatest possible usefulness to mankind, the happiest and most harmonious life and the most symmetrical growth. Again, this system of recording should be of great service to those who have charge of the entrance of candidates into colleges of dentistry, law, medicine, and others. This record should stand not only for the applicant's ability as a student, but for his special adaptability to a given profession, and no other entrance examination should be needed. Why should any second examination be made if the first is satisfactory? Is it not a declaration that the first is not to be depended on if the record is made? What a comment on the learning and teaching ability of our esteemed professors in the dental colleges that graduates

with a diploma bearing their signature and the seal of the college should fail to satisfy a state board of examiners, or be debarred from practice in another state! Surely there is a great lack of symmetry in the results of our modern college work; if not, then the work of the state board of examiners is unnecessary, for no one should be allowed to practice as a stomatologist without a diploma, and that diploma should stand as the best passport to practice.

Regarding the standard of entrance to colleges of stomatology, it should undoubtedly be high, but even this may be overdone and ill-advised. To the writer's knowledge, many who have entered the dental college as graduates of a high school have been among the worst specimens of graduate practitioners, and far below in quality those who had been received without having had such a course. Graduation from a high school as a minimum standard may be used as a basis, but this alone is not sufficient. If symmetry be wanting the high-school graduate is of poor promise and his entrance to the dental college should be postponed or discouraged. If a degree is required for entrance, and it undoubtedly should be, it is still necessary to look for other qualifications, especially if degrees may still be obtained from some sources for money and while it shows nothing of the candidate's manipulative dexterity.

By lack of symmetry in such cases is meant a deficiency in mechanical ability or literary culture, for instance, to such an extent that it would be unwise to receive the candidate. On the other hand, a young student who for some good reason has not graduated from the high school may have such a symmetrical record as far as he has gone, and may show such qualifications of promise that it would be very unwise to reject him. Of course desirable candidates do not need an entrance examination; they do not need a four years' course or one of two years; they would reach the high places in the profession in spite of the entrance examination and the college courses, and they are so well endowed, mentally and physically, that they are able to decide as to their own fitness for a certain profession. Their own desire and ambition is for the best things, and they are not limited by years in a college; they would even get on without the college, and no ordinary hindrance could prevent their success. A physician friend of mine was with me a few years ago in the Tower of London, and we stood on the spot

where Anne Boleyn, Lady Jane Grey, and Katherine Howard were beheaded. My friend remarked, "If they'd let them alone they would have died themselves long ago."

So with the most desirable men of our profession—they are such that if we let them alone they will go on with their professional development without regulations as to entrance standards and length of college courses that we spend so much time in talking about. The problem is to keep out incompetents and the unworthy, even if they may have in a fashion "gone through" some school or college with the required standard. We might have a ten-year course for Jack Blunthead and he would still be unfit, while Joseph Sharp has passed all the requirements of the ordinary graduate in two years. A matter of years alone, or even the administration of thyroid extract, will not always qualify, and there is nothing that will qualify if there be not inherent in the individual the incentive and the genius to succeed. Quality not quantity is the essential requirement, and if this be attained what can it matter whether the student has achieved it in one year or four, although the preference should be given to the one-year man? Therefore, when it is proposed to extend the dental course to four years I am opposed to it, but this should not by any means convey the impression that anything but the highest standard is advocated.

Time is too precious to compel such men as we have pronounced worthy to enter the dental college to give four years of their life in it. Three years is enough time to give to that part of the student life which is spent within the college walls. To all right-minded graduates the end of the college course is but the beginning of studentship in earnest. Out of college the student, now also a practitioner, has entire management of his education and the development of his talents, and his success and future degree of symmetry, the nearness with which he comes to the finished product in man, are limited only by himself.

Among practitioners many defects in symmetry may be observed. There are some who have developed their mechanical powers to such an extent, and have become so absorbed in some mechanical specialties, so-called, that they are unable when they look at the human mouth to see anything but a possible bridge, crown, or plate; others have a clear vision as to dollars, their other sense perceptions being weakened from disuse. In fact, atrophy is often associated

with hypertrophy, and the former may be an indirect result of the latter, both physically and mentally.

Specialties and specialists have done much to advance their particular lines of work, and this is greatly to be commended, but there are disadvantages as well, and these consist in the neglect of general considerations, which if given some attention would help much towards a more symmetrical condition. In the enthusiasm and interest which are taken in certain lines of work in our profession many of us forget that there are other departments of our work which should also receive attention; that in many directions our mental and bodily capacity is weakening through loss of function; that we are better dentists by being better citizens; that we are the best stomatologists when we have cultivated our hearts, minds, and bodies in all possible directions around the one central object which draws us all together with a common interest and a common purpose.

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## EXTIRPATION OF THE PULP UNDER PRESSURE ANESTHESIA, INCLUDING A STUDY OF AFTER-RESULTS.

BY RODRIGUES OTTOLENGUI, M.D.S., NEW YORK. READ BEFORE THE NORTHERN OHIO DENTAL ASSOCIATION, AT CLEVELAND, JUNE 7, 1904.

As an excuse for the presentation of this paper, let me state that it has seemed to me noteworthy that the advocates of pulp-removal under pressure anesthesia have counted their cases as "successful" when anesthesia has been accomplished and painless removal of the pulp has thus been made possible. Unpleasant after-results—to use a mild term—have apparently not been counted at all, or at least they have not been recounted. I have met with so many that it has seemed to me a theme worthy of serious study.

Again, the advocates of the method, when asked to explain failure —by which I mean failure to produce insensibility—have replied, "You have not properly applied the method." This is far from satisfactory to the questioner who has met failure of this character. Neither is it a scientific response to a perfectly legitimate query, nor is it a true statement, for there are cases in which no method of applying pressure anesthesia will cause insensibility, as we shall see.

Without further preliminary let me approach the subject directly, dealing with it from two aspects: first, the application of pressure anesthesia for painless pulp-removal; second, a consideration of after-results. From accurate histories of all the cases that have passed through my hands during the past year I classify the conditions prevailing at the time of resorting to pulp-removal under four distinct headings, each with a prognosis and series of resulting phenomena constant to its class.

*Class I: Freshly exposed pulp otherwise in a healthy condition.*—The prognosis in these cases is favorable throughout. Anesthesia should be perfect after a three-minute application. Hemorrhage is inconsiderable and is readily controlled. Success is almost absolutely certain in deciduous teeth.

*Exceptions:* Anemic patients; persons who have antipathetic idiosyncrasy against cocain; cavities so situated that oral fluids cannot be positively excluded.

*Examples from Practice: Case I.*—Patient a woman aged forty. An upper first molar aching badly. Applied rubber dam and removed leathery decay, causing fresh exposure of pulp with free bleeding. Pressure anesthesia attempted, using anhydrous crystals of cocain freshly dissolved in adrenalin—practically a saturated solution. Application of pressure three minutes; pulp removed entire from three canals absolutely painlessly; hemorrhage slight. Dressed with antiseptic, which on removal two days later showed no evidence of stains from secondary hemorrhage. Canals filled. Subsequent history, perfect comfort.

*Case II.*—The second temporary molar of a child aged seven. Rubber dam applied. Pressure anesthesia for three minutes; pulp removed entire, and painlessly. Hemorrhage slight. No after-trouble.

*Comment.*—I have had a great number of cases like No. I, success being as good in multirooted as in single-rooted teeth. Still, I have also had exceptions, as will be cited. Of cases like No. II I have had only five, but they have been all so utterly satisfactory that I do not hesitate to say that pressure anesthesia solves the problem of an aching exposed pulp in a temporary tooth where the tooth can be isolated with the dam. Where the gum tissue between the teeth is hypersensitive, as it commonly is, one application of the cocain is made prior to applying the dam, by which means the gum

tissue is rendered insensible. In a sixth case where the intractability of the young patient made it unwise if not impossible to apply the dam, equally good success was attained, a large piece of unvulcanized rubber being utilized and the pressure applied with the ball of the thumb, thus in a measure insuring the restriction of the drug to the cavity.

*Case III.*—Patient a young woman aged twenty, anemic. Lower second bicuspid, distal cavity. Pulp freshly exposed and apparently otherwise healthy. Application as before mentioned, and painless removal accomplished. Hemorrhage profuse, but seemingly controlled after five minutes. Dismissed with antiseptic dressing and cavity sealed. Patient returned in four hours suffering intensely. Removal of the dressing was followed by profuse secondary hemorrhage, pain subsiding with the release of the blood. Bleeding was controlled after fifteen minutes, and the canal dressed with absorbent cotton, dry, covered with sealing material. The patient was seen next day and reported no discomfort. The dressing was removed and found saturated with blood.

This and similar cases establish the fact that considerable secondary hemorrhage may follow pulp-removal under pressure anesthesia, and that it is a constant danger which should not be overlooked. It also establishes the value of a dry dressing, one that is not steeped in an oil. The dry dressing readily absorbs all blood and may inhibit the formation of a clot beyond the apex by drawing the blood within the canal. I look upon this as a valuable clinical procedure. The dressing may be rendered aseptic with some antiseptic powder, or by placing a second bit of cotton slightly moistened with an antiseptic between the canal dressing and the outer seal, since it is the ingress of infectious material through the oral cavity that we are endeavoring to prevent.

*Case IV.*—Patient a man aged thirty-two. Lower third molar, occlusal cavity, pulp exposed, but apparently not otherwise affected. After isolation with rubber dam, six applications of cocain were made, each of three minutes' duration. Arsenic was then used, and was repeated at the second sitting before the pulp could be removed. No evidences of calcification.

This patient is one in whom there is undoubtedly an idiosyncratic antipathy to cocain. Some years ago in treating the first molar on the same side I essayed cocain cataphorically. The current was

sustained for eighteen minutes without anesthetic effect, but the patient then evinced a numbness almost amounting to temporary paralysis of the side of the neck and arm, which curiously enough endured for exactly eighteen minutes. I record this case as of interest, but while I have used this experience as a basis for one of the exceptions under my rule for this class, I must also state that it is a unique case. However, I deem it worthy of mention because idiosyncrasies against special drugs are common in the experience of physicians—some individuals, for example, tolerating tremendous doses of morphin, while others exhibit toxic symptoms if only minute doses are administered.

*Case V.*—This case is introduced as an example of the exception noted, namely, where oral fluids cannot be positively excluded. Cavity in lower third molar of a man thirty years of age. It involved the greater portion of the buccal wall and part of the distal, so that it was almost impossible to apply the dam, there being more or less leakage under the clamp, which was but insecurely held. Cocain pressure failed, probably because of this leakage, and arsenic was applied. The pulp was removed at the second sitting, but infection supervened, and the difficulty of completely sterilizing the canals made it finally necessary to extract.

*Class II: Pulps aching, in teeth that are already filled, and found to be exposed or nearly so upon removal of filling.*—The conditions usually prevailing are sufficiently unfavorable to render prognosis doubtful and more than ordinary precautions advisable. This sort of teeth is here placed in a class apart because certain dangers are present the recognition of which at the outset tends to render the treatment more scientifically exact and the outcome more certain to be favorable. A study of the class shows that the filling in the tooth must necessarily have been intended as either permanent or probational. If the former it is probably of gold or amalgam; if the latter it is usually zinc oxyphosphate. If a metallic filling be present the history of the case will reveal whether the pulp affection is due to failure on the part of the dentist to remove all of the carious material, in which case caries will have been slowly progressive; or whether, where for example the filling has long been in place, the pulp has been injured since the filling. But in either case we have a morbid tissue to deal with. This is more certain to be true where the filling is probational in char-

acter. If the previous attendant has filled with oxyphosphate it is evidence that the condition of the pulp caused him to doubt the advisability of using a metallic filling. In any case, then, a pulp aching and covered by a filling may be considered as a morbid tissue, and prognosis will depend upon the conditions found upon removal of the filling.

If the filling was of a permanent character and had long been in place, it may be premised with considerable certainty that the too-close proximity of the metal or some outward exciting agent has caused a deposition of calcific material in the pulp, and this will place the case under Class III, to be described hereafter. If the pulp be suffering from a traumatism it is possible that a ruptured vessel has brought about the pain, and prognosis should be as in Class I, except that there will be more likelihood of hemorrhagic disturbances. Where the filling was probational in character, and had been in place for but a few weeks, the probability is that caries has been progressive until pulp-irritation has ensued.

In all these cases it is important to carefully note the first exudation from the pulp as it is uncovered. If a drop of pus should escape it shows that infection is already present. This being true, for reasons that will later be explained, pressure anesthesia should never be attempted at the first sitting; instead, a dressing which will be both sedative and antiseptic in character should be applied. Ceylon cinnamon oil may be relied on in such conditions. Usually the escape of pus and the slight hemorrhage alleviate the suffering anyway, and the main purpose of treating antiseptically is to avoid danger of forcing septic material through the apex, thus infecting the tissues in that region. Where there is no pus present, and no calcification, prognosis should be favorable throughout. As an evidence of the need of caution in these cases, and in support of my advice to treat antiseptically for at least twenty-four hours prior to using pressure anesthesia, I will cite the following cases:

*Case VI.*—Patient, a woman aged about thirty, presented with aching lower second bicuspid. Tooth filled with oxyphosphate, which had been in place for two months, during all of which time the patient declared that the tooth had "grumbled." As the last bit of the oxyphosphate was forced away from the pulpal wall the tiniest drop of pus escaped and was quickly washed away by the free hemorrhage which ensued. Not recognizing the clinical value of

the presence of pus, and therefore not considering it essential to use a sterilizing agent in a cavity from which a tight filling had just been removed, I proceeded directly with my cocain application, which was entirely successful, the pulp being painlessly removed entire after three minutes. A profuse hemorrhage ensued which was finally controlled with hydrogen dioxid, and a dressing of cinnamon oil was placed in the canal. The patient was dismissed for two days, but she returned next day reporting pain and tenderness. The dressing was removed, slight secondary hemorrhage ensuing, and a new dressing was placed. Twenty-four hours later I was called by the patient on a telephone, and she reported increasing pain. I recommended one-eighth grain of morphin and a visit to me on the next day. The morphin acted well but the symptoms were progressive, so that on the next afternoon I was obliged to visit the patient at her house and lance a well-developed abscess.

This sort of case will be discussed fully in the latter part of this paper; I will say here merely that in my opinion in this case the application of pressure anesthesia carried along the blood tracts of the pulp septic germs, forcing them beyond the apex, where upon the removal of the pulp tissue they found pabulum in the secondary hemorrhage, which afforded an environment favorable to bacterial propagation. I expect to be asked why I did not use formalin, as has been recommended, prior to resorting to the cocain. I did not at that time deem it requisite, but on this point the following case will throw some light.

*Case VII.* Patient a young woman aged about twenty. A lower second molar had been filled with oxyphosphate for about three years. This filling had been undermined by caries, and the pulp was found to be exposed. The carious matter was removed and a portion of the pulp was easily cut away, showing that it had become affected. Later, however, a painful area was reached and cocain became necessary. Formalin was used freely in the cavity and on the pulp for full five minutes, after which cocain was applied and the pulps from both canals painlessly removed. Profuse hemorrhage followed, which was allowed to drain thoroughly until it apparently ceased, after which the canals were cleansed and dried and an antiseptic dressing applied. I confidently expected a happy outcome, yet this tooth persistently continued "uncomfort-

able" for several days. Believing that perhaps I would get better results by filling the roots, I thoroughly sterilized the canals by the Schrier method, as is my invariable custom, and filled the canals. By the next day the tooth was so sore that I was forced to remove the root-fillings. The canals were again sterilized and dressed with an ethereal solution of iodoform, my usual salvation in such emergencies, and it was three weeks before I dared fill the canals a second time. There was no abscess in the true sense of the word, but my explanation is that, as before, septic germs were carried beyond the apex and an infected blood-clot was present, the tooth giving trouble until this had become absorbed. Apparently the application of formalin (forty per cent) for five minutes did not inhibit the germs probably present in the pulp itself.

*Class III: Calcific material present.*—Full anesthesia by pressure is rarely obtainable. This is true in all varieties of calcifications, whether nodules or deposition of secondary dentin. Hemorrhage seems to be less probable and is usually more easily controlled, yet in one or two cases I have noted profuse hemorrhage, both primary and secondary.

*Case VIII.*—Patient a man. Central incisor, worn down by attrition. Desiring to apply a crown, I drilled as far as I could toward the pulp, and the sensitiveness becoming unbearable I resorted to cocain. Seven applications of three minutes each proved absolutely ineffectual. I then applied arsenic, and at the next sitting was able to drill through the secondary dentin, fully exposing the pulp, but the sensitiveness then again obtained. It is of interest to record that another attempt with cocain was unsuccessful, and this has been my invariable experience after arsenic has once been applied. [Since reading this paper I have had complete success with a pulp which had resisted a twenty-four-hour application of arsenic. Consequently this statement must be modified.] A second arsenical application therefore became necessary.

*Case IX.*—Patient a woman aged about forty-five. Lower cuspid; pulp exposed under ordinary caries. Three applications of cocain having failed to relieve the sensitiveness I diagnosed pulp-stones, and despite the pain burred away the upper portion of the pulp. Another application of cocain enabled me to remove the pulp, but with considerable pain to the patient. This specimen was immediately examined under the microscope, and the

upper part was found filled with pulp-stones, one being of great magnitude. Some evidences of cocain were found throughout the uncalcified part of the pulp, which accounts for the partial anesthesia. The fact that cocain may be detected with the microscope will receive fuller discussion later in this paper.

*Class IV:* This includes *so-called sound teeth* in pyorrheal mouths, where pulp-removal is resorted to as a measure of treatment. Three obstacles to success are to be encountered: First, there is great probability of pulp-calcification; second, hemorrhage is a common sequence; and third and most important, the socket being already in an infected condition, apical abscess is a not improbable sequence.

*Case X.*—The patient was a man in middle life with considerable pyorrhea persisting in spite of treatment. An upper molar being peculiarly sensitive, pulp-removal was decided on. Pressure anesthesia proved perfectly successful so far as painless removal was concerned, there being no calcification present. Hemorrhage was profuse and not easily controlled. In spite of antiseptic precautions apical abscess ensued, causing considerable disturbance until a sinus connecting with the pyorrheal pocket was established.

*Case XI.*—Patient, a man of forty-five, presenting an upper molar having palatal root badly denuded and extremely sensitive, practically amounting to continuous pain. Slight pyorrheal conditions present in the mouth and about this particular tooth. The roots were cleansed as thoroughly as possible prior to treatment, and the pulp was removed under cocain anesthesia—which, however, was far from painless, there being pulp-nodules throughout all three branches of the pulp, and separate applications of cocain were needed for each root. In this case (as stated under Class III) there was very little hemorrhage, and after one antiseptic dressing and thorough root-sterilization the three canals were filled. Within a week an abscess formed over the anterior buccal root, and root-amputation was required, after which a perfect recovery was made.

The deductions to be made from the above would seem to be, either that I have been most unskilful, or else that pulp removal under pressure anesthesia is a more complex operation than would be imagined by one without personal experience and who could judge solely by the recent contributions to current literature. In

the second part of this paper I shall endeavor to account to some extent for the troubles which I have experienced.

To those who have not found pressure anesthesia all that has been promised—and I have little doubt that I am not alone in my adverse experiences—let me call attention to one important fact. We all have for years been removing pulps after an arsenical application. In resorting to the cocain method I think we have overlooked an important clinical difference in the two procedures. A pulp dressed with arsenic reaches us in an altered condition too well understood for it to be needful here to discuss it; removal under cocain is practically an anesthetic surgical operation, and we should remember that all phenomena which may occur elsewhere in the body are equally to be combated in this region, except of course such as may be purely local in character.

The first consideration is the rupture of the bloodvessels. Without stopping to discuss the exact distribution of these vessels, whether from a single vessel entering at the foramen or whether from one or more which traverse or anastomose with those of the pericementum, suffice it to state what we all admit, that these vessels do pass out through the foramen. The removal of the pulp under cocain anesthesia presents the common phenomenon of a bloodless tissue, followed by an apparent copious flow of blood. This, however, is not a true hemorrhage. The vessels being torn asunder and the pulp forcibly drawn out, the blood of the pulp itself is squeezed out and remains in the canal. The blood is removed with tampons of absorbent cotton or bibulous paper, and the canal further cleansed with the syringe. If at this period the canal is seen to slowly fill again with blood, what I would term a true hemorrhage is present—a torn vessel is bleeding.

Under exactly similar conditions anywhere else in the body what would the surgeon do? If possible he would ligate the stump of the bleeder, or if very small he might twist it. Neither procedure can be followed in this situation. The dentist usually undertakes to control this hemorrhage with some hemostatic. Is this good surgery? Can you imagine a surgeon doing a major operation (involving bony tissue) closing his wound and leaving within it a vessel which has bled and which has been stopped solely by the application of a drug? I think the surgeon would feel safer to not fully close his wound, but to establish drainage in some fashion.

Why? Because he realizes that blood that is stanched in this manner (as in ordinary nosebleed, for example, stopped by plugging with a styptic) may start to flow again. The force with which the blood flows may be sufficient to remove the clot formed at the torn end of the vessel, in which case the bleeding continues until another clot is formed. This is known as a secondary hemorrhage —and I beg to assure my hearers that it is a never-to-be-forgotten possibility where a pulp is removed alive, whether under cocain or any other anesthetic.

Wherein lies the danger from this secondary hemorrhage? A clot is formed. Now, this clot must be cared for. If it escape infection it will be absorbed, but even without true infection we may have distension of the parts, causing pain, and we may have a true inflammation. Infection may reach this clot in several ways. In mouths affected by pyorrhea, especially where there is a pocket on the particular tooth under treatment, it is conceivable that the pus germs may readily migrate through the slight barrier of bone between the bottom of the pyorrhea pocket and the region about the apex where the blood clot lies. Again, we are told that there may be germs within the blood tracts which do no harm until emptied out upon a favorable medium, when propagation and consequent pus formation are a necessary sequence. The germs then may be in the clot itself, and as soon as the blood leaves the vessel these germs are freed from the inhibiting action of the leucocytes. Lastly, and this is a point on which I make great stress, the germs may have been in the cavity and may have been carried into and through the pulp with the cocain solution, and this brings me to the promised explanation of the statement that the cocain could be detected with the microscope.

I relate the following with some hesitation, because I am not positively assured that I am right, not having had sufficient material with which to make my belief assured conviction and beyond dispute. However, I will give my experience, reserving the right to withdraw my present views after further study of the facts. For the past two months it has been my habit to examine with the microscope all pulps removed under cocain. In the first specimen so examined it seemed to me that I could plainly see the crystals of cocain, and they seemed to be deposited along the blood tracts. If this were true, it became at once manifest that our anesthesia

is not merely a physiological result of mere superficial contact with the cocain, but that the cocain in solution is actually taken into the blood-vessels of the pulp itself. By allowing the pulp to dry the solvent which carried the cocain would evaporate and the crystals would be deposited. I was eager to verify this proposition and promptly examined the next pulp removed. In its perfectly fresh condition no appearance of the cocain crystals could be seen, but after half an hour they were plainly visible, again following the blood tracts to the very apex. After accumulating four or five specimens, in all of which these crystalline bodies could be discerned, I carried the experiment a step further, and undertook to reform the solution within the pulp after it had dried.

To do this I took one of the dried specimens and soaked it in adrenalin for two minutes. The result was not entirely satisfactory; the whole appearance of the tissue was altered, and while the crystals seemed less apparent, still I could not decide that they had been redissolved. Next I placed a drop of cocain dissolved in adrenalin on a slide and allowed the solution to evaporate. This left a coating of cocain on the slide, and these crystals so far as I am a judge have the same general appearance as those seen in the pulps. A final decision, however, cannot be reached without the aid of the polariscope. Finally I examined pulps devitalized with arsenic, and these do not show any such crystalline masses.

In the particular specimen to which previous allusion was made, the one in which pulp-nodules were present, I could note the cocain in characteristic masses about the nodules, but beyond, throughout the uncalcified portion of the pulp, the appearance was quite different. Here, if the cocain was present at all, it seemed rather to have passed down between the canal walls and the pulp, forming a thin coating over the entire pulp, so that the whole mass had the appearance of an icicle. This specimen fortunately I still have; all the others were ruined by my mounting them in balsam. For some reason the crystals have practically disappeared after this mounting. I will request time, therefore, for further study of this rather interesting phase of the subject.

It is because of my present belief that the cocain solution actually enters the pulp, following the blood tracts, that I strongly advise thorough cavity sterilization, for certainly any germs present may be taken up with the solution and carried into and even

through the pulp to the tissues about the apex. I am not as yet sure that we have any reliable cavity sterilization which can be considered effectual within the few minutes usually allotted to the work. For this reason, in the presence of actual pulp-suppuration I should recommend sealing a germicide within the cavity for at least twenty-four hours, this to be followed by the further sterilization of the cavity after applying the dam. It might be that it would be safer to add a germicide to our cocain solution. By this means, perhaps, even though some infectious material may become mixed with the solution, its deleterious influence may be inhibited. Following the method of the surgeon, I recommend a dry dressing in the canal proper, which in turn may be covered with a little ball of cotton carrying an antiseptic. I think I have seen good results from this method of drainage, for on several occasions where I had not really expected a secondary hemorrhage I have found my dressing literally saturated with blood, and in these cases the teeth have remained comfortable.

Lest it be imagined from the foregoing that all my experiences with cocain pressure have been unsatisfying and troublesome, and that I am therefore contending against the method, I beg to state that the cases reported above are rather exceptional. I do believe, however, that they are of such a character as to be constant under like circumstances; that is to say, that the same teeth or the same sort of teeth treated in the same manner will be followed by the same sequelæ. It is for this reason that I have thought it worth while to record and if possible classify some of my failures. I say some, for while the majority of my pulp-treatments by this method have been entirely successful, it is also true that I have not given a full list of all the troublesome cases which I have had.

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## PREVENTIVE DENTISTRY—THE DENTAL NURSE.

BY C. M. WRIGHT, D.D.S., CINCINNATI, O. READ BEFORE THE KENTUCKY STATE DENTAL ASSOCIATION, AT LOUISVILLE, MAY 17-19, 1904.

There is no department of medical or surgical practice in which locally-applied hygienic and preventive measures are so effective as in dentistry—no one in which a stitch in time so surely saves nine.

If we could each of us from to-day do as the apostle of dental prophylaxis—Dr. D. D. Smith of Philadelphia—is doing every day in his practice, there is no question as to the magnificent results to the world in improvement in health and comfort.

If we could begin to-day to make it our first duty to secure the enthusiastic cooperation of our patients, and then to have regularly appointed sittings with them once every fortnight, or once every month, or once every sixty days, and at these sittings thoroughly polish every exposed surface of every tooth, we would inaugurate an era in dentistry. This era would represent conditions far above our present attainments. Our foundations would be so grandly perfect that the superstructure would naturally assume proportions of grace and elegance far exceeding our present expectations.

We would then be aggressive and *begin* the war against the enemies of the teeth and mouth, instead of doing as we all are to-day, supinely waiting for the foe to take this outpost and that citadel before we move. We would prevent the initial action of bacterial and diathetic solvents of enamel and dentin, and so fortify the surface that adhesive plaques of skirmishers could get no foothold—and real prevention would result. It is time for this era of the doctrine of prevention to begin, and it must commence by operative measures upon teeth before they need repairing. Contrary to the conservative doctrine that only the sick need a physician, we must in this era of prevention employ surgery in advance of sickness. This is as legitimate for the teeth and gums as vaccinations, the boiling of drinking water, sanitary drainage, or any other modern precautionary measure against other diseases.

We have indeed substantial grounds for our belief that prophylactic surgical and manipulative operations upon the teeth will accomplish vast and easily-recognized results in every case. In this department we have passed out from the hypothetical fog that envelops the preventive intestinal surgery and extract inoculations dreamed of by Metchinkoff and other scientists. But clear as are our reasons, logical as are our premises and conclusions, the prophylactic dental surgery here referred to is not practiced by the profession; it is not taught in the colleges; it is not presented to our patients as of special or vital importance. We as a profession do not know how to perform the operations. We have never been taught or trained in this department of dental surgery.

Who among us has taken extracted teeth into the laboratory and seriously practiced the art of polishing them? We have practiced porcelain inlay work and cohesive gold work upon these extracted teeth at the bench, and have learned methods of manipulation, but we have not regarded the polishing of natural teeth as an operation that requires thought and a specially-acquired *tactus eruditis.*

We who for from twenty to forty years have followed a routine method of scaling teeth at five dollars a sitting, and we who during the past few years have tried to be more thorough and more "surgical" in our efforts to remove hematocalcic deposits in the treatment of pericemental diseases, will still be surprised at the degree of manipulative skill and dexterity required to accomplish a thorough polishing of every surface of each tooth. The operation is fundamental in its importance, to anticipate the insidious attacks by accidental or constitutionally derived ferments and deposits.

Dr. D. D. Smith has exhibited his patients to many dentists to show the results of this operation, and every practitioner so favored has felt that his eyes have been opened to a new view of dental prophylaxis and, I say this with deliberation, to a *new operation.* Have we ever called in a friend to show a set of natural teeth because we have *polished* them? We have displayed our fillings, our inlays, our crowns and our cases of artistic prosthesis—but not the results of our skill in this line. Just here is where our neglect and indifference is made plain, and I claim that as a profession we do not know how to polish the teeth. We lack the skill, and our tastes and talents do not encourage us to acquire it.

Without special thought, practice and effort to acquire this skill we are as incompetent to acquit ourselves well as is the surgeon who has practiced general surgery all his life when he is brought face to face with the Lorenz bloodless surgery for curvatures and hip-joint deformities. He is at home when amputations, removal of tumors and the various otomies are presented, but this is a different kind of operation, and he has not practiced and gained skill in the performance of it.

We have neglected prophylactic surgery, and the reasons for our past and present neglect still exist in full force. I have tried to portray these reasons in my feeble way in other papers. Dr. Rhein with his facile pen has drawn them so clearly and in such a logical and masterful manner that it is not necessary here to repeat them.

I, like my brethren in the North, South, East and West, am not strong enough to change habits of practice in such a radical way as this new practice demands, no matter how strongly it may appeal to me. We are all of one species and, like the leopard, are marked with beautiful spots, and we can't change those spots. It is because of this that I have advocated the establishment of a sub-specialty in our profession. It is for this reason that I have urged the dental colleges to arrange a partial and special course for the training of a class of refined women in this one operation, namely, the polishing of the teeth of the children, youths and adults before those teeth need the services which we now render so well. Dr. Rhein has entered the field as an advocate of this innovation and has suggested the name "Dental Nurse" for these women. It is an especially happy thought and will help to popularize and distinguish the particular province of these sub-specialists.

The initiatory steps in this matter must be taken by the state societies, and then the dental colleges will be forced to move. They will then arrange a course for the dental nurse and award certificates upon the satisfactory completion of the same. The colleges have the material for perfect training of the dental nurse—the lectures, the patients, and the power to enforce the practice in their infirmaries.

It is an innovation and we are conservative, but I believe that if we stop to think seriously on the importance and advantage of this movement we will demand its acceptance by the dental colleges and will fully inaugurate not only the doctrine but the practice of prophylactic surgery. The results will add to our professional dignity and usefulness, and will increase the demand for dentists and dental services.

The finger of prophecy points in no uncertain way to two basal lines of future practice which will fully occupy all of our ingenuity, skill and courage to develop and perfect. I refer to a broader appreciation of orthodontia on the one hand, and to esthetic restorations with porcelain on the other, or to the concealment of our art which has become rather brazen in the last ten or twenty years. These two fields afford ample opportunity for us to maintain our unique reputation among medical specialists for ingenuity and mechanical skill, and our licensed dental nurse with deft fingers will prepare the people for an intelligent appreciation of the higher dental art.

# Digests.

REPRODUCING THE NATURAL CONTOUR OF ARTIFICIAL TEETH ON THE LINGUAL AND PALATAL SURFACES OF ARTIFICIAL DENTURES. By William Middleton Fine, D.D.S., Philadelphia. Read before the Academy of Stomatology, Philadelphia, January 26, 1904. In describing this method for making and finishing dentures, particularly vulcanite work, I shall refrain from going into detail regarding the best methods for taking impressions, running models, etc., but I will state at once that a good plaster-of-Paris impression is positively essential for the attainment of a good result.

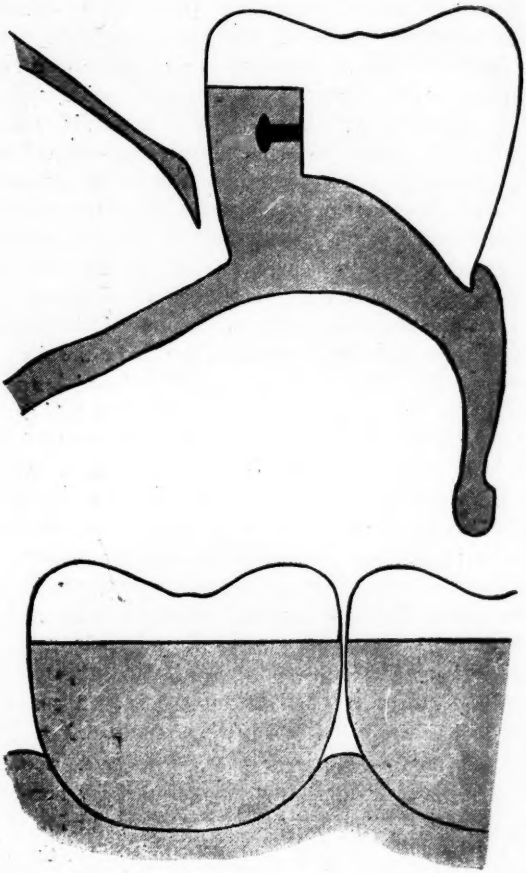
While watching one of the demonstrations of Dr. George H. Wilson the idea of carving the wax to obtain the natural contour of the teeth on the lingual and palatal surfaces came to me. Therefore this method is not entirely original. Dr. George B. Snow of Buffalo published an article in 1899 relating to the Lingual Conformation of Dental Plates, but confined his ideas to the rugæ and thickness of the plate. The late Dr. Charles J. Essig also made reference to a method for carving the lingual and palatal surfaces of artificial dentures. Again let me state that I do not claim priority or originality in method of applying the rugæ, tinning the models, etc., but from what I have been able to learn from men of prominence in the dental profession, and from examination of our literature, I feel justified in saying that the method of carving the wax to obtain the natural contour of the teeth on the lingual and palatal surfaces, to which I have the pleasure of directing your attention, has not heretofore been published nor generally used.

First, we take a good plaster-of-Paris impression, and if a vacuum chamber is used one should be carved in the impression. The next step is the model, from that the wax bite, then the articulation, and the making of the base plate and the trying in of the piece. Every dentist is familiar with this phase of the work. The teeth are set up in the usual way in wax. The gums are carved and the whole denture made to reproduce the lost teeth and supporting tissues. After this operation is carried out in detail the case is tried in the mouth, when, if found to be perfectly satisfactory in every way, the patient is dismissed and the case taken to the labora-

tory for finishing. Here is where we commune with nature; we strive to reproduce the beautiful and natural, the teeth and gums,

FIG. 1.

FIG. 2.



the rugæ and all the peculiarities of the roof of the mouth. We try to be artistic and practical at the same time, though it is hardly

possible that the dentist will ever be able to make an appliance so near to nature's models that one cannot detect the difference.

In carving the lingual and palatal surfaces to represent the natural teeth I have a small spatula for this particular work. It is made from a broken plug-finishing file No. 101, and shaped like the diagram. (Fig. 1.) The end A is the most used in contouring the wax, as I will describe. Take the articulator in your left hand and open it so that the upper denture is in front of you and at the top; start at the last tooth on the left side and proceed to carve the wax, using point A of the wax spatula, carve downward, using the palatal surface of the porcelain tooth as your guide, and shape up the wax to represent the natural tooth as it stands in the natural gum. (Fig. 2.) After you have formed the palatal surface of the second molar, proceed to the first, and so on around the arch of the denture until you have completed the work, then apply the rugæ. The method of technique taught by Dr. A. Dewitt Gritman to his Freshman classes is employed. To do this one must have several pure tin or zinc dies; tin is better. Take an impression of your own mouth to start with, or better still, if the patient has well-defined rugæ, take an impression and make the die; after you have the die, take a piece of No. 40 tin foil and burnish it over the rugæ on the die, using the rounded end of a lead-pencil eraser to press the foil into contact with the die. If a metal burnisher is used it will be likely to tear holes in the foil, but a soft eraser or piece of rubber will give a good impression and will not do any damage. A piece of tin foil should be used large enough to cover the entire palatal surface of the wax denture, and have a free margin of foil one-quarter inch in addition. After the burnishing is completed remove carefully and fill the impressions in the tin foil (the side that comes next to the die) with wax, by melting it on a spatula and dropping it on the foil; then heat the spatula rather hot and smooth it down. By this means we have a smooth surface that is brought into contact with the palatal surface of the wax base-plate. After this is done press the piece, wax side down, into the wax base-plate and finish around the teeth by burnishing very carefully, but do not burnish the edges of the tin foil down flat—allow it to stand up at right angles so that when the case is invested the free edges will be embedded in the plaster and hold the foil in place. The result is a tin-foil covering to the palatal surface

of the wax denture, and after the foil has been applied to the gums, to which it is burnished on in the same way, the case is ready to flask. After the wax has been boiled out cover the model with very thin tin foil, No. 4 or 6. We have now a tin-faced matrix in which to pack the rubber. The case is then packed with rubber in

FIG. 3.

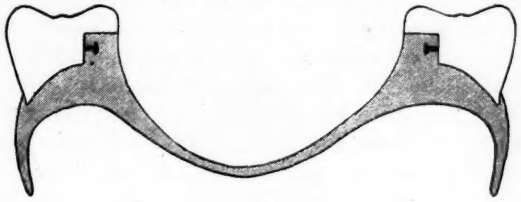


FIG. 4.

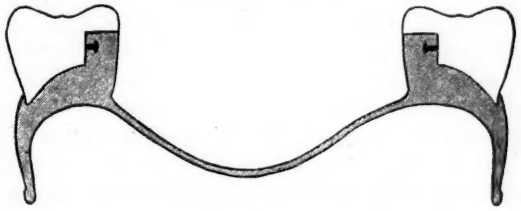


FIG. 5.

the usual way, placing the pink rubber for the gums in around the teeth first; after this is completed pack in the red rubber. Close the flask and vulcanize.

Now a few words regarding flasking, finishing, etc., etc. Flask the cases in the usual way, any style flask may be used; separate the flask, remove wax, pack in rubber, and place a piece of the waxed cloth (that which comes over the rubber as we purchase it from

the dental depots) between the two sections of the flask so that you may separate them and ascertain if you have enough rubber. Do not have too much and do not cut too many vents for the surplus material to flow out; for if you do the rubber will not be under the same steady pressure when vulcanizing that it should be. Do not close the flask with too much pressure at first, do this gradually. After the flask is closed place it in the vulcanizer with cold water, fasten the lid down tight, and proceed to vulcanize. Allow the vulcanizer to run for about ten minutes and then open the safety valve and let the air out. Then take from one-half to three-quarters of an hour to run the vulcanizer up to 320°, and then vulcanize at that point for one hour and a half. This will give you a good substantial plate and one that will take a very high polish. In finishing the cases it is necessary to scrape but very little if the case has been properly waxed up and tinned. If necessary to scrape, use a very sharp pointed scraper and scrape around the teeth and between them first, doing the rest of the plate in the usual way. Polish with pumice and felt cone, pumice and stiff brush-wheel, chalk and stiff brush-wheel, chalk and soft brush-wheel, and last a very soft brush-wheel and rouge. If a greater polish is desired, use a chamois wheel and rouge. A still greater polish may be obtained with dry plaster of Paris and oil, using the finger-tip to polish with. Clean the rouge from the plates with a soft laboratory brush and castile soap.

By this method dentures can be made much thinner, and they present a more artistic appearance and are more natural. They are sure to please those who are unfortunate enough to be compelled to use an artificial appliance. This method may be used in partial cases, and is by no means confined to a full case. I use it in partial cases, both vulcanite and gold with vulcanite attachments. Even in a case of three teeth the patients will tell you how much lighter and thinner the plate feels. They can speak more distinctly and it is easier for them to masticate their food.

Instead of finishing the denture up smooth to the porcelain teeth along the masticating surfaces, as shown in Fig. 3, the case is given a more natural appearance along the gum line on the palatal surfaces, as shown in Fig. 4. In Fig. 3 is presented the older method of waxing up the case, but in Fig. 4 is given the newer method of carving to represent the natural teeth. One can easily appreciate

the "feel" of the denture to the patient and how much lighter the denture is in weight.

Fig. 5 shows section of a full case finished and ready for the mouth. Sometimes I carve the wax in such a way as to allow of the free passage of floss-silk between the teeth to the gum line.

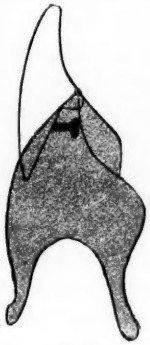
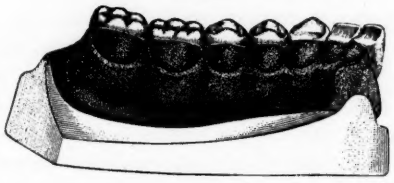


FIG. 6.

The saliva fills the spaces between the teeth on the denture in the same way that it does in a normal mouth. This doubtless aids in the articulation of words, also in the mastication of food by allowing the saliva to flow down the outside of the plate, over and between the teeth, as it does normally, and mix more thoroughly with

FIG. 7.



the food. The rugæ also aid in the articulation of words and mastication of food. When the palatal surface of the denture is smooth the tongue has but little power to hold a morsel of food upon it, while with the rugæ the food is easily managed. The importance of the rugæ has been set forth by Dr. Burchard, Dr. Harrison Allen, Dr. Charles J. Essig, Dr. George B. Snow, and others.

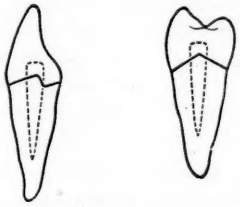
Some professional men object to the spaces between the teeth on artificial dentures, claiming they are too difficult to keep clean. Is it not the proper thing to clean one's own teeth with floss-silk? Why not a denture? Those who wear artificial appliances should take as good care of them as those who have all the natural teeth in place, using a tooth-brush, floss-silk, tooth-powder, and antiseptic washes.

Articulate speech consists of a modification of the voice by means of the lips, tongue, teeth, palatal arch, and rugæ, and various modifications of the oral cavity and its contents. The true sounds come from the vocal chords. The dome of the oral cavity assists in the modification, and I believe if the spaces are placed between the teeth on dentures, to correspond to the natural teeth, there should be nearly the same modification of the voice. Of course a denture, no matter what kind or style, changes the voice slightly. We get nearer to nature by reproducing the rugæ and each tooth accurately. The peculiar metallic hissing sounds produced by an attempt to pronounce the letter s, especially in such words as "susceptibilities," involving a multiplication of s sounds when a smooth surface is given to the denture, are entirely obviated by the use of the rugæ, as the sound is broken when it comes in contact with them and is softened. Or, for example, in singing or talking in a vacant room the voice has a certain tone. Now, if the room be changed by building off the corners with boards or curtains the tone of the voice is also changed. The same principle holds good in prosthetic dentistry. Another example: A bridge from the first bicuspid to the third molar, the space between being filled with dummies. A singer will tell you that such a piece will change the voice, sometimes to such an extent that it is almost impossible to reach certain notes. It is evident that we must try to reproduce the natural mouth as nearly as possible.

The lower denture should be made in the same way as the upper denture, with the exception of the rugæ, etc. There is a slight depression below the necks of the teeth on the lingual aspect of the lower jaw in the normal mouth. This is reproduced in the lower denture, as is shown diagrammatically in Fig. 6. Fig. 7 shows a section of a full lower case ready for the mouth.—*International.*

ASEPTIC SUPERIORITY OF THE PIN CROWN OVER THE BAND CROWN. By Joseph Head, M.D., D.D.S., Philadelphia. Read before the New York State Dental Society, Albany, May 13, 1904. In these days of asepsis many appliances that have passed unchallenged for years are open to questioning scrutiny. Any mechanism that causes infection or irritation of the tissue around the necks of the teeth must be regarded as a menace to the health of the entire mouth. Years ago, when Miller demonstrated what dental decay was, when he made his experiments on the efficiency of mouth-washes, when he demonstrated the presence of dangers arising from bacterial plaques around the necks and between the teeth, he presented to the world modern prophylaxis. In doing this he made it obligatory for all scientific dentists to

FIG. 1. FIG. 2.



see to it that appliances through their filth-collecting proclivities shall not be a source of greater harm than benefit.

However much our theories concerning pyorrhea may differ, no one will deny that irritation or infection around the necks of the teeth is of prime importance in its origin, and there is no one who believes that pyorrhea can be cured until all sources of irritation and infection from around the teeth have been removed. Among such sources of infection and irritation the band crown appears in aggressive prominence. Theoretically the band at the neck of the tooth can be made almost smooth with the contour of the tooth. But is this so practically? Can the most expert dentist trim a root and fit a band under the gum and be sure that the sharp edge of metal does not project enough to cause irritation and consequent infection every time the tooth springs under the impact of mastication? If this doubt be present with the most expert, how surely must it be present with the average operator! In answer to this let us all recollect the ill-fitting bands we have deprecatingly ob-

served on the crowns made by other dentists; let us even remember the crowns made by ourselves—that we thought beautifully fitted; that subsequent events made us examine out of the mouth, and caused us to wish that someone else had fitted same.

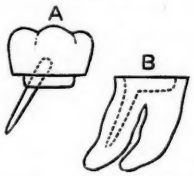
The fitting of a band to the neck of the root under the gum can be likened to the well-known game of drawing a pig on paper with the eyes closed. The general outline of the pig can be drawn with fair accuracy, but the characteristic details are just as hard to get and as frequently lacking as are the fine indentations and curves of the root. Yet in spite of all these serious objections no experienced operator will say that the band crown should never be used. In bridgework or in fractured or badly decayed roots it fills a want that can hardly be filled by any other device. But when we use it let us recognize its dangers as well as its advantages; let us admit that the best-fitting band forms a ledge under the gum that may prove a source of lodgment for infection, and that the seriousness of this danger will depend entirely upon how cleanly are the habits of the patient, and how prone the oral tissues are to contamination. If, then, it be admitted that the band *per se* has serious objections, it is incumbent upon us to avoid its use in all crowns wherever sufficiently good anchorage can be obtained to obviate the danger either of the loosening of the cement or the fracturing of the root.

This anchorage with the ordinary pin crown can now be obtained in every instance where the root is solid and not decayed below the neck of the gum. If in upper centrals, laterals and cuspids the face of the root be formed wedge-shaped, as shown in Fig. 1, with the notch on the lingual aspect so as to support the front wall of the root against fractures, crowns perfectly adapted will readily bear all the strain that can be brought against them and yet have no overhanging edge to irritate the gum. With all bicuspids, upper and lower, and all lower incisors and cuspids, the head of the tooth should be in the form of a simple wedge, as shown in Fig. 2, so that lateral pressure on the sides shall be supported by the entire root. This easy method of forming the head of the root can be used also in the upper centrals and cuspids, but the notch, as before described, has in these instances given the best results.

This method of conforming both porcelain-faced metal pin crowns and all-porcelain crowns to the heads of roots has been so often described that it needs no further description here; let us pro-

ceed, therefore, to show how molar pin crowns can be made of sufficient strength and stability to avoid the necessity of the band. The face of a molar root ordinarily cannot be efficiently formed into a simple wedge, as in bicuspids or front teeth, for the planes would be so long and the bite so short as to imperil the strength of the crown, and therefore the following device is substituted: The cavity of the pulp-chamber of a molar is just level with the gum margin. The head of the root should be ground flat and smooth. The pulp-chamber should be enlarged and formed into a deep cavity suitable for forming an inlay; the posterior root-canal should also be enlarged as far as may be safely done for the admission of the pin of the porcelain crown. When this has been done insert and fit a platinum pin as far into the root-canal as possible. Then remove the pin and burnish and swage into the pulp-canal chamber and over the head of the root inlay platinum foil until a perfect

FIG. 3.




matrix is obtained. Then punch the platinum pin through it, well down into the posterior canal, and fasten the foil and pin together with hard wax. These should be withdrawn from the mouth and invested and soldered together either with gold or platinum solder. They should then be replaced in the tooth and reburnished to make sure of perfect adaptation. Porcelain the color desired for the tooth should be fused within the matrix of the pulp wall, around the pin and over near to the edges of the root margin, leaving the platinum near the margins free from porcelain, to allow of a final adaptation before the last fusing of the crown is completed. When this has been done the matrix and pin can be placed in the tooth and an impression taken in which the porcelain-filled platinum can be removed. Wax should be flowed over the pin and under the side of the matrix to permit of easy removal, and the model run into the impression with the pin and matrix in place. When the model is obtained a slight amount of heat applied to the platinum matrix and

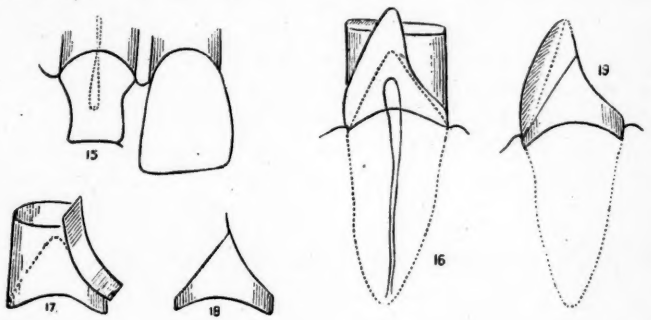
pin will permit of its easy removal, when the pin can be cut off the proper length and the crown built up according to the necessities of color and bite. Fig. 3, A and B, will show the finished crown and the outlines of the cavity in the prepared root.

Carved crowns are frequently most artistic, but they lack the strength of porcelain that has been formed in a mold under pressure. For that reason it is usually better to use a manufactured tooth. This can be ground and fused into position with porcelain as desired. Before the edges of the platinum matrix are covered by the last fusing it will be frequently advisable to burnish them finally on the edges of the root in the mouth to be sure of perfect adaptation. Before the tooth is set the platinum matrix can be removed, when the pin can be roughened, and the porcelain plug that fits into the pulp-chamber undercut. Then the canal and pulp-chamber can be undercut, and the tooth cemented into place in the ordinary manner. The chief support of this molar crown lies not in the pin, but in the inlay of porcelain that fills the pulp-chamber. If two pins are deemed advisable they can be used, if not too long and if the pulpal openings of the canals are sufficiently enlarged to make it possible to overcome the divergence of the canals when the pins are being withdrawn.

If it be desired to make these molar crowns without the use of a model the following method can be employed: When the matrix and pin are stiffened with porcelain as herein described, a rubber countersunk tooth of the proper size and color should be ground to fit the head of the root and the bite. The pins of the porcelain tooth should be cut away, and its cavity filled with porcelain paste. This can then be placed into its proper position on the platinum matrix and fused—being careful, as before stated, to leave the platinum edges free for final burnishing and finishing.

Cement should always be used in setting these pin crowns, because gutta-percha has not sufficient rigidity to prevent a possible slight withdrawal of the pin, and the chief strength of these crowns lies in the perfect adaptation to the head of the root, and in the tensile strength that is present and always exerted in the pin so long as it is held firmly in the canal without room for lateral bending. Gutta-percha when exposed at the neck of the tooth is also apt to become spongy and a collector of infection that is most objectionable.—*Cosmos.*

JACKET CROWN. By J. F. Ross, D.D.S., Toronto, Can. If the tooth to be crowned contains a cavity it must be properly excavated and filled with cement or amalgam. Reduce the length of the crown of the tooth by about one-third, then with thin carborundum discs trim off about one-quarter of the width on each of the mesial and distal surfaces, thus leaving the tooth about one-half its original width, at the same time removing the enamel at the cervical circumference as perfectly as possible. Then reduce the labial surface sufficiently to accommodate a fair amount of porcelain body, with which to attain a thin porcelain veneer. Remove enough of the lingual portion to allow the thickness of the platinum of which the jacket is made, providing the occlusion demands it. (Fig. 15.)




To the prepared tooth fit a straight tube of platinum about 32 B. and S. gauge (Fig. 16). Slightly compress this tube mesio-distally, after which cut out the lingual portion from the cervical margin. Solder to tube as it now appears a new lingual part of iridio-platinum about 32 gauge (Fig. 17). The next procedure is to grind down on a lathe corundum wheel the labial surface of the tube, and by exercising care and little pressure a thin film of platinum will remain, which will prevent the porcelain subsequently added from entering the interior of the jacket (Fig. 18). The platinum, which now remains projecting beyond the incisal edge of the stub, is cut into several slits, which are folded over irregularly on the labial surface, and this affords the best possible attachment for the porcelain body. The platinum jacket being now completed, a layer of porcelain is placed on its labial surface, and biscuited in the furnace.

After cooling it is placed back on the tooth in its proper position, more body is added, and the facing or veneer adjusted, noting proper relation to the other teeth. Surplus moisture is then dried out with blotting paper or cotton napkin, and the whole removed carefully from the tooth. Place more body when required and fuse again. The metal parts must then be polished, and the crown is complete (Fig. 19).—*Dominion.*

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CLASSIFICATION OF THE PRINCIPLES AND FORCES OF RETENTION. By Dr. M. Dewey, Keokuk, Iowa. Read before the American Society of Orthodontists, Buffalo, 1904.

*Importance of Classification.*—No one thing has contributed more toward placing orthodontia where it is to-day than classification. Not only have causes of malocclusion and regulating appliances been arranged in order, but individual cases of malocclusion have also been classified so as to enable us to speak of them with a certain amount of comprehension not known in former times. Anchorage has been arranged and classified so that each term denotes some idea to those who have given it study. It was to an extent due to a certain form of anchorage that the practice of orthodontia has been revolutionized—I refer to the "Baker anchorage."

When we reach retention we find no such classification as has been applied to the other departments of this subject. It has been ignored in part and left to take care of itself. Much has been said in the past in regard to regulating appliances and treatment, but little has been mentioned about retention. I consider retention of equal importance with tooth movement in the correction of malocclusion, for if we fail to retain the teeth in their corrected position what have we gained? Many results of cases reported in the journals indicate the condition immediately after the appliances for tooth movement have been removed, but very few show the ultimate result, and I am afraid that in many cases the results were not as favorable in after years, when they should have been better than they were immediately after the removal of the retainers.

My attention as a teacher was called to this lack of classification, for I found it far more difficult to impart as good an understanding of retention as of the preceding subjects. Therefore after much thought I concluded that retention might be classified as well as

the forces of occlusion, etiology of malocclusion and anchorage had been.

*Retention Defined.*—Retention may be defined as an applied force to maintain certain relations between certain objects. Under this definition might be placed the retaining fee paid to the operator by the patient to maintain certain fixed relations as to temperament, character and time of appointments. Retention in orthodontia is force applied to teeth in order to hold them in certain relations to one another. These forces of retention are of two kinds, natural and mechanical. The natural forces are those exerted by natural laws. They are by far the most important, yet they have been the most ignored and misunderstood in the past, and consequently innumerable failures have resulted. Teeth returning to their former position, and sometimes even to worse positions than they occupied first, may in most instances credit their return trip to a neglect on the


Fig. 1—Simple Retention.

part of the operator to reckon with the natural forces of retention. Many cases of malocclusion are simply the result of a disturbance of or tampering with Nature's laws, and no matter how well you may have seemingly corrected such malocclusion, if you have failed to enlist the natural forces of retention you can never hope for success in the fullest degree. These natural forces are as follows: 1. Normal muscular pressure. 2. Harmony in the sizes of the arches. 3. Forces of the inclined planes. 4. Normal interproximal contact. 5. Normal alveolar process and peridental membrane.

In normal muscular pressure we have the symmetrical and harmonious force exerted by the tongue, lips and cheeks. If these act normally not only are the teeth held in their positions, but the sizes of the arches are also maintained, resulting in a well-balanced face. On the other hand, if this force acts abnormally it forms one of the most potent causes of malocclusion and mars the facial lines. It then follows that if we desire to correct a case of malocclusion in which abnormal muscular pressure is an etiologic factor, this disturbing

element must be corrected lest the old story of teeth "going back in spite of prolonged mechanical retention" should again disturb our peace of mind.

Harmony in the size of the arches expresses the relation which one arch bears to the other. There is always a certain degree of force exerted by one arch upon the other during the entire life of the individual. If one arch be too large or too small, having been made so voluntarily or involuntarily, a compensating abnormality will be found in the opposing arch. Therefore, no matter how nicely the teeth may be arranged in their respective arches, unless the opposing arches harmonize with one another no permanent success can be expected because this natural retentive force has not been established.

*Inclined Planes.* So much has been said in recent years of the inclined planes that it is needless for me to give any lengthy comment on these as a natural force of retention. It is a force ever present during mastication as well as when the teeth are at rest. While it is a great force for good, it is equally as great in producing so-called harm when applied incorrectly. If these inclined planes come in proper contact every time force is brought to bear on the cusps their influence will tend to retain the teeth in their position. No inclined plane is so small or so insignificant that we can afford to overlook it in our work. It is the force not comprehended at all by men who advocate extraction for the prevention and correction of malocclusion.

*Interproximal Contact.*—The next natural force, the normal interproximal contact, is of equally great importance as those before mentioned. It has scarcely been spoken of in the past, probably because writers have failed to recognize its independence from the force of the inclined planes. By the force of interproximal contact is meant the force one tooth in an arch exerts upon its approximating teeth. This force is passive to a certain extent. It may be illustrated by the blocks of stone in an arch of masonry. The contact point being only a point on a nearly round surface, it is to a great extent like the point of contact between two spheres. If force is brought to bear from one to the other directly parallel in line with their diameters they will remain stationary, but if applied at different angles they will roll. If once the interproximal contact points of the teeth are moved out of line the teeth tend to move further. Often we

see cuspids and premolars in torsal occlusion when really the inclined planes are not out of harmony, but because the contact points are not in proper relation the teeth slip on one another to a certain extent. In cases of extraction the teeth move in the arch because they have lost their normal approximal contact, yet the relations of the inclined planes are not always disturbed. The tendency of the lower cuspids to return to old positions of torsal occlusion can be explained in this way. It is impossible for me to see how any one who is familiar with these forces can advocate extraction and expect to get even a


Fig. 2—Simple Reciprocal Retention.

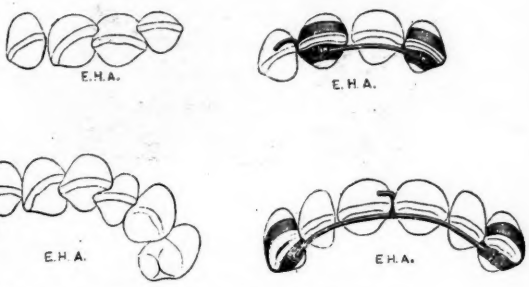


Fig. 3—Compound Reciprocal Retention.

fair result. In all cases of extraction one or more of the natural forces of retention is disturbed.

*Influence of Alveolar Process.*—The force derived from a normal peridental membrane and alveolar process is of much importance and must be studied during the entire treatment of a case. We must be familiar with its structure from a histological and physiological standpoint so that no permanent harm may be done during treatment. In cases of malocclusion caused by diseased peridental membrane and alveolar process, no matter how long the teeth may be retained, if the physiological conditions have not been established the case is one for permanent mechanical retention.

*Mechanical Forces.*—Mechanical forces are those exerted by artificial means. They should be employed only in a manner to assist the natural forces. While mechanical forces must be used they are second in importance. I have classified these as simple retention, reciprocal retention, occlusal retention, occipital retention, occlusal and occipital forces of retention having subdivisions. Simple retention is obtained, Fig. 1, by attaching a tooth which has been moved to one which is already solid in the arch, in order to get sufficient force to hold the moved tooth until the natural forces can be established. In applying force in retention it should be "applied in the direction of the backward tendency."

Reciprocal retention is the pitting of the backward force of one tooth against another having a tendency to move in an opposite

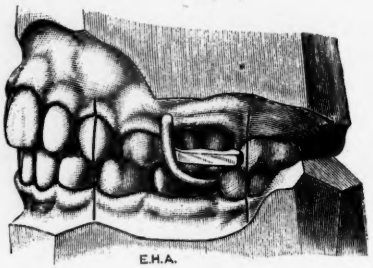


Fig. 4.

direction. In this we have two divisions, simple and compound. Simple reciprocal retention, Fig. 2, is applicable in cases in which the backward tendency of one tooth is pitted directly against the backward tendency of another. Take, for example, a case in which the incisors have been rotated in opposite directions and one tooth retains the other by means of retaining devices so attached. Compound reciprocal retention, Fig. 3, is indicated whenever certain teeth are retained by force exerted from some other teeth which have a tendency to move in different directions. In this form of retention other teeth than those to which the retaining appliance is attached are also being retained. Although some portions of the device may rest against the teeth yet it is not rigidly attached. For example of this class I would cite cases in which the six anterior teeth are being retained when bands are placed on only two of the teeth. By careful study of this division of retention we will be

enabled to eliminate a large amount of unnecessary bulk in the form of bands and spurs for the benefit of our patients and still preserve our work.

In occlusal retention the force of the teeth in one arch is pitted against the force of the teeth in the other arch. Of this class we again have two divisions, simple and stationary. In simple occlusal retention, Fig. 4, the backward tendency of the teeth in one arch is pitted against the other. The appliance is so attached that the teeth may tip to a certain extent. While this plan is very useful it always requires watching. In stationary occlusal retention, Fig. 5, the appliance is attached to the teeth in a manner compelling them to move bodily if they move at all.

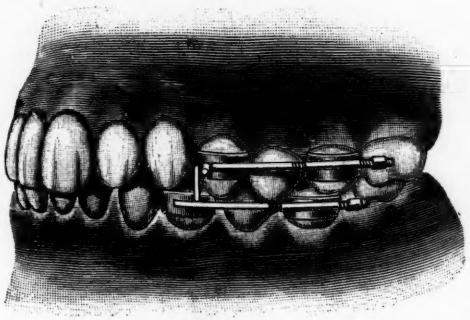

*Fig. 5.*

These forms of occlusal retention are employed when the mesiodistal relations of the arches have been changed. In the construction of stationary occlusal retention the same plan is followed as in the construction of stationary anchorage. The appliance is so placed and fitted to the teeth in one arch that when the force is brought to bear from the opposing arch the teeth are held rigidly and no movement is possible except to move them bodily through the process. While this device occupies more space in the oral cavity than the simple occlusal retainer, it will be found of advantage in retaining cases of "Class II" treated by moving the mandible forward. The disadvantage in the past with this plan of treatment has been the difficulty of retention, which is overcome to a great extent by stationary occlusal retention. The success to be had from the use of this

plan of retention will depend upon the rigidity which the manner of its construction will afford.

In occipital retention the force is obtained from attachment made to the occipital portion of the head. It is too old a method to need our attention at this time.

Mechanical retaining devices are of two kinds, removable and fixed. Removable appliances are those which the patient can remove from the mouth at will. Fixed appliances are those attached to the teeth in a manner preventing removal by the patient. Each kind has certain advantages not possessed by the other.—*Items.*

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NON-EXPANDING PLASTER. By P. B. McCullough, D.D.S., Philadelphia. What degree of credit for priority attaches to the following original experiments with plaster the writer is unable to state. It would seem that credit for fixing definitely the treatment of the water might be assumed. The writer first saw in a pamphlet published by Dr. X. Dodel and entitled "Pointers for Dentists" the statement that plaster mixed with lime-water would not shrink. Following this the writer, as a test to prevent "expansion," used lime-water that had been prepared for domestic use. This water had been filtered, then boiled, and when cold lime had been added to saturation. A mix of plaster was made with this water and poured in glass tubes; that the tubes did not crack after several months was evidence that the plaster had not expanded. As the stock of lime-water was reduced by its use in the laboratory water drawn from the supply pipes was added as required. Later a second test was made and all the tubes cracked within twelve minutes. That the first tests were made with boiled water and the second with water without boiling made it clear that the water must be boiled to prevent expansion; otherwise the addition of lime makes no perceptible difference.

In order to establish definitely wherein the secret lay the following tests were made. A quantity of water was filtered, then boiled for fifteen minutes, and when cold unslaked lime was added in excess of saturation. When the solution had become clear it was decanted into a smaller bottle, that the sediment might not be stirred up in handling. With this water a mix of plaster was made of the ordinary consistency and placed in a glass tube, tapping the tube on the bench to insure solid filling. After several hours it was

soaked in water as drawn from the spigot, with no change; it was then placed in a vulcanizer resting on a flask above the water and subjected to 320° F. for an hour; this test showed the tube without crack. The second test consisted in adding a little salt to the lime-water. In the third test a little water from the supply pipes was added to the lime-water. For the fourth test plain boiled water, cold, was used. In each case the tubes cracked within twelve minutes.

A solution of gum-arabic made with plain water was used, and the test showed the tube without crack. This last experiment was not further tested, because more plaster could be mixed with the lime-water than with the gum-arabic water, hence with the latter the plaster was less dense. It was further thought that the free solubility of the gum-arabic in water might cause the plaster to soften in vulcanizing.

The use of lime-water in all of my plaster work, particularly for vulcanite dentures, has been attended with such uniformly gratifying results that I would consider a return to the former practice a retrograde change. For impressions I use "impression plaster," for the model and for flasking the "slow-setting." This latter has the advantage of becoming harder than the "medium," these being the three grades of dental plaster with which the writer is familiar. That the reader may have all the information in my possession bearing upon this valuable discovery the following data are submitted:

DOCTOR X. DODEL, San Francisco.

MY DEAR DOCTOR:—I see in your "Pointers for Dentists," No. 3, 1903, on page 4, "To prevent shrinkage in plaster, mix with lime-water." I will very much appreciate your stating whether there is any special way for preparing the lime-water. Yours very truly, P. B. MCCULLOUGH.

February 19, 1904.

DR. P. B. MCCULLOUGH, Philadelphia.

DEAR DOCTOR:—Lime-water is a saturated solution of calcium hydrate, and you will find its preparation in the American Pharmacopeia. Use it *cold* instead of common water. It is inexpensive and you can get it at any drug store. Yours very truly, X. DODEL.

February 24, 1904.

It will be seen that in the "Pointer" referred to the word "shrinkage" is used, and likewise in my letter. This is unsatisfactory, as the problem with the dentist has always been to prevent expansion. It must be observed, however, that lime-water bought at a drug-

store is presupposedly made with distilled water, and when so prepared it would serve the purpose, but as there can be no certainty that bought lime-water is always so prepared, no dentist using it can be said to do so intelligently without the above information, particularly as the writer is informed by a druggist that not one per cent of the lime-water sold is made with boiled water, and that at most only filtered water is used.—*International.*

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THUMB-SUCKING. By H. L. Ambler, M.D., D.D.S., Cleveland. A— B—, when a baby, acquired the habit of thumb-sucking. He would take hold of his right ear with his right hand and put the thumb of his left hand into his mouth. In this way he would go to sleep, or if cautioned about this habit he sometimes went to sleep without his thumb in his mouth, but it involuntarily got there sooner or later. The habit was not indulged in during the day when awake. In order to overcome this habit various expedients were resorted to, such as putting gloves on; putting painkiller on his thumb; tying his hands together. This habit continued until he was nine years of age, at which time he was broken of it by the various means used, and by continually telling him not to suck his thumb.

The habit has not produced a V-shaped arch, but has spread the permanent upper centrals, so that there is a space of 3-16 of an inch between them, and has given a pouty appearance to the upper lip, and he still has the habit of mouth-breathing, which is being corrected by tying a bandage under the chin and over the head every night, as there are no adenoids or polypi of the nasal passages. The upper incisors were drawn nearly together and held in place until new bone formed, by bands soldered together and cemented on the teeth. There are different ways of making an appliance for such cases, but I refer you to the "American Text Book of Operative Dentistry," page 795, where Doctor Farrar says: "In case the incisors are separated and the roots parallel, if you draw them together by an ordinary clamp band the crowns will tilt toward each other until they touch at the mesio-incisal angles. Up to this time the apices of the roots were practically fixed points, and the alveolar process between the roots was condensed and absorbed as the teeth moved. As soon as the crowns touched each other at the mesio-incisal angles these became fixed points, and as the power was still

continued at the necks of the teeth, the roots began to move until they were practically parallel. To prevent the crowns sliding past each other and overlapping, a guide was constructed as shown in Fig. 819. The same appliance will serve for retention."

This habit produced a tumor ¾x¼ inch on the inside of the lower lip and at seven years of age he was placed on the operating table, an anesthetic given and the tumor removed. No recurrence has taken place in last two years. An incision was made in the mucous membrane and the tumor dissected out; this was a simple operation. The wound was closed with two sutures, treated antiseptically, and there was a rapid and complete recovery; fed on liquid food. There was no pain accompanying the growth, which was slow in formation, as it had been noticed for several years. The growth looked like a series of small cysts or lobules separated by their septa, containing a mucoid fluid. It caused some inconvenience and considerable disfigurement by protruding the lower lip; up to the time of operating it had never been medicated nor treated in any way. Long continued sucking of the thumb irritated the mucous glands and caused mild chronic inflammation which terminated in hypertrophy.

Tumor cells multiply like their prototypes, the normal cells, by a process of indirect division or segmentation known as karyokinesis. The tumor consisted of dilatations of the mucous glands of the lower lip owing to a stoppage of the ducts (of the mucus follicles) and thus the growth progressed in size. This tumor was homologous, as it conformed to the tissues in which it grew. Such tumors are apt to be benign, and this was no exception. The more the new growth resembles normal tissue the greater the probability that it will be spontaneously arrested in its growth, and the greater the chances of its being benign; also benign tumors are common to all ages, slow in formation, and do not infiltrate into the surrounding tissues; there is no lymphatic involvement unless they are inflamed. Generally the overlying tissues are hardly disturbed and there is rarely ulceration.

Some authors might term this growth a mucous cyst, as the mucous glands were obstructed and the secretion which accumulated behind the obstruction dilated the glands, forming a cyst or cysts of retention. The contents of a cyst are always inclosed in an investing membrane, of the same structure in all essential particu-

lars as that lining the original cavity from which the cyst had its origin. In this case the growth had to be dissected out because it was so firmly attached to the surrounding tissues that it could not be enucleated.

Doctor Bodecker says: "A vulcanite base-plate may be made with a very short pin set in just behind the centrals, pointing backward. It may be worn day and night, and does not inconvenience talking if the pin be not too long. At night it is especially useful, for at that time the habit is most marked."

Dr. James W. Cormany says: "I would suggest that the mother, when the child is asleep, talk to it: 'Mary, you will not wake up while I talk to you,' and then follow with a talk just as she would to the child if awake; that what she is doing is wrong, that it is a bad habit, and she should not do it any more; in fact, 'You will not do it any more.' Repeat this to the child, say six times each night for two or three nights, when lo! it will be gone."

For the treatment of stomatitis, boric acid and a small amount of sugar in a little sterilized bag are given the infant to suck. Same may result in a cure, but we should be afraid that the child would acquire the habit of thumb-sucking. We would also advise mothers not to give children a sugar-teat to suck for the purpose of keeping them quiet and possibly of lulling them to sleep. Thumb-sucking is occasionally acquired from the habit some children have of putting a corner of the pillow-case or sheet into the mouth and sucking it; thus it seems very important that young children should be carefully watched.—*Summary.*

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INSERTION OF ARTIFICIAL DENTURES. By N. C. Leonard, D.D.S., Nashville, Tenn. Read before the Second District Dental Society, January 11, 1904. For a number of years I have been skeptical concerning the truth of the somewhat dogmatic teaching that atmospheric pressure is the principal force concerned in the retention of a simple upper plate, and my recent study of the question has convinced me that this unbelief is not without a reasonable foundation. In fact, my conclusions would indicate almost the entire elimination of atmospheric force as one of the factors in the retention of dentures. A clear understanding of the forces concerned, and of the laws governing them, is essential to an intelligent application or a proper conception of the relative part played

by these forces in sustaining the weight and resisting the force that tends to dislodge the plate.

*Atmospheric Pressure Defined.*—Atmospheric pressure is simply the weight of the atmosphere, which by reason of its peculiar physical nature manifests itself with equal force in every direction. At sea level this pressure is about fifteen pounds to the square inch of surface, and as it is the same upon every surface the weight of an object is not affected by it, excepting to the extent of the actual weight of the volume of air displaced; that is, the force being equal in all directions makes a perfect balance, which being constant is not perceptible. An unbalance may be created, however, by lessening the pressure on one side of a body by removing a portion of the atmosphere and thus creating a partial vacuum. This unbalance is in direct proportion to the volume of air removed from a given space.

*Adhesion Defined.*—Adhesion is another element that must be taken into consideration and given a prominent place as one of the principal forces concerned in the retention of a plate. This is one of the molecular forces similar to if not identical with that of cohesion, and manifests itself principally between solids and fluids. It is this force that makes it possible to wet the surface of a body, and is the reason for the clinging of drops of water or fluid to a solid. Adhesion may also manifest itself between the surfaces of solids brought into close contact. One of the simplest illustrations of the force of adhesion may be made with two plain glass plates. By moistening the surfaces and placing them in contact we find that it takes considerable force to pull them apart; in fact, well-fitting plates with a film of water between may be made to sustain a weight of from a few ounces to several pounds to the square inch, the amount of weight sustained depending upon the degree of adaptation of the two surfaces. This is a case of simple adhesion, in which atmospheric pressure does not even play a part.

It seems to be a popular belief that in the physical arrangement just suggested atmospheric pressure is the principal force that must be overcome in the separation of the two plates when the separating force is applied at right angles to the surface. In opposing this belief I wish to state that my position is thoroughly consistent with recognized physical laws, and in eliminating atmospheric pressure as one of the forces concerned all of the phenomena may be scien-

tifically accounted for. While it is true that in this experiment the atmosphere is excluded from between the glass plates, its force is transmitted hydrostatically to the inner surfaces through the film of water that fills the interstice and a perfect equilibrium is maintained.

To illustrate this point a little more clearly, we will suppose that in the experiment suggested one drop of water is just sufficient to fill the interstice between the plates when they are adjusted together. This drop is placed on the center of the lower plate. As it rests here we know that it is under pressure of the atmosphere, which exerts upon it a force of about fifteen pounds to the square inch of surface exposed, this force tending to compress it by forcing its molecules closer together, and the molecules resisting of course with exactly the same force and in every direction. When the other plate is adjusted it does not in any way relieve this tension of the molecules of water, which continue to exert force or react in every direction. In other words, the air acting on the edges of the column of water transmits the same force to the inner surfaces of the plates that would be manifested if the water were replaced by a column of air.

An idea which appears to be generally accepted by dentists, and which is taught in some of our leading text-books, is that when the surface of a plate is well adapted in every part to the mucous surface in the mouth, and the air excluded by a film of mucus and saliva, atmospheric pressure is manifested only on the lingual and labial surfaces of the plate, and that this is the force which prevents its dislodgement. This idea is absurd and wholly inconsistent with physical principles, and until it is entirely eliminated from the mind there can be no proper understanding of the true forces concerned and the part which each plays in the retention of the plate. As in the experiment with the two glass plates, a perfect atmospheric balance is maintained through the hydrostatic action of the film of fluid between the two surfaces, and there is no weight-sustaining force from the air. So far as I can see there is no room for a rational argument on the other side of the case, and it must be admitted that in the physical arrangement illustrated by the two glass plates atmospheric pressure may be entirely eliminated as one of the weight-sustaining forces.

*Retention of Artificial Plates.*—In the adjustment of a simple upper plate, without the so-called air-chamber, the physical arrange-

ment is practically the same as in the experiment with the glass plates, with two exceptions: First, we have two irregular surfaces adapted and adjusted to each other instead of two plain surfaces; second, one of the surfaces is soft and elastic. The first is an advantage, since it increases the area of surface exposed to the action of adhesion and prevents largely the tendency of the two surfaces to slide upon each other; the second precludes the possibility of securing the greatest force of adhesion by allowing the force to be overcome gradually from the uneven yielding of the soft tissues. When traction is made on the plate, tending to dislodge it, the surface of the mucous membrane, by reason of its elasticity and the adhesive force with which it clings to the plate, is slightly lifted; adhesion is first overcome at the edges of the plate and the mucous membrane is peeled off, as it were, the air and excess of fluid following up the separation.

While the entire surface of the mucous membrane covered by a plate has more or less elasticity, we know that usually there are certain areas which are less yielding than others to pressure, either on account of the varying density of the underlying integument or of the close proximity of the bone to the surface. In the surface ordinarily covered by a full upper plate the hard area is that part forming the vault of the arch, and corresponds to the hard palate. When a plate which comes in contact with the entire mucous surface is adjusted in a case of this kind we find that when pressure is made on the grinding surfaces of the molars and bicuspids on one side, as in masticating, the yielding tissues of that side are compressed more readily than those in the center of the arch, and the hard area in the palatal portion acts as a fulcrum; the opposite side of the plate is lifted and may be pried loose, the elastic tissues on that side slightly following and allowing adhesion to be again overcome first at the edge of the plate.

In order to secure the services of atmospheric pressure in sustaining a weight greater than that of the actual weight of the volume of air displaced by the object, there must be either a partial vacuum on one side of the body or there must be such a physical arrangement as will prevent the entrance of air or other matters into the space from which some force is tending to remove the matter occupying it. If a thin, light glass tumbler be filled with water and a piece of plain glass plate carefully placed over it and held till the tumbler is

inverted the support may then be removed from the glass plate while the tumbler is held in this position, the glass plate remaining in position over the mouth of the tumbler without the escape of a drop of water. This experiment illustrates the weight-sustaining power of both forces—adhesion and atmospheric pressure. At first it would appear that atmospheric pressure was the force that sustained the weight of both the water and the glass plate, and here again is a popular fallacy. In fact, weight of the water only is sustained by atmospheric pressure, and that of the glass plate by adhesion. In this case the weight of the water, or gravitation, is the force that tends to produce a vacuum. For convenience we will say that the water weighs exactly one pound and that the area of the mouth of the tumbler is five square inches, representing the section of a column of air, the pressure of which would be seventy-five pounds. If this pressure were manifested only against the under side of the glass plate then the entire force of seventy-five pounds must be overcome before the glass plate can be separated from the tumbler and the water allowed to escape. We know, however, that at most only a few ounces will be supported in the position of the glass plate. The explanation is the same as that in the case of the two glass plates adjusted together, that is, the weight of the atmosphere is manifested equally on both sides of the plate. If we reverse the experiment by placing the tumbler right side up on the table and lift the glass plate we find that the tumbler remains in its position on the table and we have only the weight of the glass and the adhesion of the water to overcome.

To fall within the limits of this essay these statements must be made somewhat dogmatically, as the absolute proof would be too long and technical to include. There is, however, abundant proof to justify these conclusions, which are thoroughly consistent with recognized physical principles, and they are mentioned here in order to better illustrate the application of these same forces and laws to the subject under discussion.

If the mucous surface of a plate when it is adjusted to place comes in close contact with the mucous membrane at every point we have then, so far as atmospheric pressure is concerned, a perfect equilibrium, and to secure the services of this force in sustaining the weight separation of the two surfaces must occur at some point within the periphery while at the edges the surfaces remain in con-

tact; that is, adhesion must first be overcome at a point within the circumference, while the undisturbed relation at the edges prevents the ingress of air which would reestablish the equilibrium.

Granting for the sake of argument that we have a mouth in which the mucous tissues are tightly bound down to a hard and unyielding surface *only in the center* of the vault, while the membranes covering the rest of the surface possess the usual degree of elasticity, and a well-adapted plate be adjusted in this case and pressed well into place in order to secure good contact, and then traction be made on it at right angles to the surface, we would find again that the soft parts by virtue of their elasticity and adhesion would be slightly lifted, and adhesion must be first overcome in the center about the area where the tissues are unyielding. The moment that adhesion was overcome at that point there would be created a partial vacuum, over the area of which the atmosphere on the opposite side of the plate would manifest pressure in proportion to the degree of exhaustion of the cavity created. Since the separation of the two surfaces at this point could amount to only the fractional part of a line without breaking up the adhesion to a point where the external air could be freely admitted, and knowing that the mucous membrane has the power of absorbing a considerable amount of air which may be easily extracted from it, we can easily see that the degree of exhaustion obtained would not secure enough force from without to make an appreciable difference in preventing the dislodgement of the plate.

In reality, however, these specific conditions would seldom occur, since the hard palatal portion of the arch usually extends backward to the palatal edge of the plate, and consequently air would be freely admitted from the outside the moment that the two surfaces were separated. In any case if atmospheric pressure were the principal weight-sustaining force it would be more strongly manifested during a practical use of the plate while biting on the incisor teeth. Every dentist knows from clinical observation that pressure in this region is the easiest means of dislodging the plate. If traction be made in a downward direction in the incisal region of an upper plate while the distal edge is held in close contact, the traction being sufficient to overcome the adhesion and lift the plate away from the surface, a considerable unbalance may be created in the atmospheric force that would aid very materially in preventing the complete dis-

lodgement of the plate. Since, however, there is no tendency to dislodge the plate in its proper use by force exerted in this direction this point is valuable only in "impressing" the patient. Even this seeming phenomenal resistance to displacement is not in a majority of cases due largely to atmospheric pressure, since traction produced at this point and in this direction must first overcome the greatest force of adhesion.

*Air Chambers and Relief Spaces.*—An important point for consideration is the relation borne by the so-called "air chamber" and "relief spaces" to the question under discussion. If a cavity of definite shape be made in the palatine surface of a well-fitting upper plate we have, when the plate is adjusted to the mouth, a definite area of surface which does not come in contact with the mucous membrane; that is to say, there is, adjacent to the mucous membrane, a space or recess in the plate containing air. This cavity can be partially exhausted of its air if suction be made with the tongue at the palatal edge of the plate. This causes the soft tissues directly above the cavity to be forced down into it and against its edges, partially filling the cavity and preventing for a time the ingress of air from the outside. Thus a partial vacuum is maintained for a while and the services of atmospheric pressure are secured, but only about the definite area of the vacuum chamber, the amount of force manifested being in proportion to the degree of exhaustion and the area of the space. Over the rest of the surface of the plate a perfect atmospheric balance is maintained just the same as before suction was made. And here again is a point that seems to have been misunderstood by some of our text-book authorities. In the last edition of "Harris' Principles and Practice," in an article in which atmospheric pressure and air chambers are discussed, we find the following statement referring to the oft-used illustration of the "leather sucker" toy used in lifting a flat stone: "Traction upon the center, as in the case of a disk of wet leather upon a flat stone, will draw in the edges and create a vacuum in the center. It might be supposed that in this vacuum space lies the power that raises the stone; whereas it lessens the power by reducing the area of stone in contact with the leather, even if the vacuum is perfect." From this statement we see that the author assumes that the atmospheric force which lifts the stone in this simple experiment is manifested only about the area where the

leather remains in contact with the stone. In reality the reverse is true. The force that does the lifting is manifested only about the area where the leather has been lifted away from the surface, while a perfect equilibrium is maintained about the part that remains in contact.

But to return to the consideration of the vacuum in the air chamber of the plate; the length of time that this partial vacuum may be maintained, granting that the plate is well conformed to the mouth, is dependent upon several conditions: First, upon the degree of exhaustion and the consequent force with which the mucous membrane is held against the edges of the air chamber, thus modifying the facility with which air or fluid may enter from without; second, upon the sharpness of the angle at the palatal edges of the chamber—a sharp edge making the entrance of fluid, etc., more difficult; third, upon the resistance and porosity of the soft tissues in the region of the air chamber; fourth, upon the amount and quality of mucus discharged from the glands in and around the area covered by the plate, and fifth, upon the amount of force tending to dislodge the plate. These five variable conditions modify to a greater or less degree the facility with which the unbalanced atmospheric force re-establishes its equilibrium. We know that mucous membrane has the power of absorbing air which it will readily give up, and that air may even be extracted by suction from the circulation. From these sources, and by the gradual flow of mucus and saliva, the vacuum is soon reduced and the atmospheric pressure equalized.

This is simply illustrated by producing suction on the barrel of a key or small bottle and leaving it attached to the lip or tongue. It will hang till the vacuum has been reduced by air extracted from the tissues, when it will drop off from its own weight. This illustration will also indicate the degree of stasis produced in the tissues under pressure by leaving a blue place the size and shape of the opening in the instrument used, and will suggest the amount of inflammation that would soon be induced by the constant irritation from even a slight vacuum. Should the atmospheric force manifested only about the definite area of the vacuum chamber be alone just sufficient to support the weight of the plate (a less force would scarcely be worth consideration in point of utility), and could other forces be fully eliminated so that the entire weight of an ordinary plate might be suspended by about three-fourths of a square inch

of mucous membrane (the area ordinarily covered by an air chamber), it is safe to say that the amount of active inflammation which would be induced in the tissues in twenty-four hours would be unbearable. The fact that a part of the weight of the plate would always be supported by other forces would not lessen the tension of the soft tissues forming one side of the vacuum space, as the force tending to reduce the vacuum is constant whether it be supporting the weight of the plate or not. Since the value of an air chamber, as a vacuum chamber, is in proportion to its area the advocates of its practical usefulness are inconsistent who do not insist on extending its area to include the entire palatal portion of the plate, with the exception of a narrow but reasonable margin along the distal edge for excluding the air.

While I do not believe that the so-called vacuum chamber is valuable as a vacuum chamber in securing the services of air pressure, I believe that in some cases good results may be had from its use merely as a *relief space,* and sometimes perhaps by interfering to a degree with the lateral motion of the plate in cases where there has been hypertrophy of the membranes into the chamber. I do not, however, deem either of these reasons a sufficient excuse for the insertion of an air chamber, as I believe the disadvantages are greater than the advantages from its use.

In the experiment with the two plain glass plates a significant point lies in the fact that if an excess of water be added or allowed to remain around the edges after the plates have been firmly pressed together we find that capillary attraction is so strongly manifested that the two surfaces are forced so far apart that the full force of adhesion is lost and but little weight will be sustained. This illustrates two valuable points in utilizing the force of adhesion for retaining dental plates in the mouth: First, that the closest contact of surfaces is necessary to secure the greatest adhesion; second, that capillarity, where there is an excess of fluid, will interfere with this close contact, and even overcome the force of adhesion altogether by forcing the surface of the plate away from the mucous membrane. This latter point is illustrated by the difficulty of retaining an upper plate in the mouth where there is a profuse flow of mucus and saliva, and it is the removal of the excess of fluid from underneath the plate that is one of the reasons for the frequent pressing up and sucking action of the tongue exhibited by nearly

all patients who wear a plate. An abnormal flow of mucus and saliva is frequently stimulated or induced by the presence of a new plate in a mouth not accustomed to wearing one, and a plate that seemed to fit perfectly at first may appear loose and unstable after a few hours' wear.

In order to secure the most perfect adaptation of surfaces in adjusting a plate to place considerable force is necessary to secure contact with the mucous membrane at every point, and for this reason it is necessary that the pressure be equally distributed. If there be hard areas in the surface covered by the plate these places will receive most of the force, and in this way interfere with securing good contact with the more yielding tissues when the plate is pressed to place. For this reason the pressure should be "relieved" at these points by carefully scraping the surface of the impression over the areas corresponding to the hard places in the mouth, and the "bearing" increased over the very soft areas by a similar operation on that part of the surface of the model that represents the very yielding tissues.

A few laboratory experiments will illustrate what slight inaccuracies of adjustment of two surfaces will lessen the degree of adhesion. The shrinkage of a modeling composition model for a plate without undercuts will lessen the adhesion of the two surfaces more than half that manifested when the model is first made. This will suggest the inaccuracies that may occur in the construction of dentures as a result of expansion, shrinkage or warpage from molecular changes that take place from the different processes in the materials used in their construction, and will account for many of the difficulties in securing a perfect fit which may be attributed to other causes.

In a paper so brief as this one must necessarily be, many things that have an important bearing on our subject must be left unsaid, but its incompleteness would be too manifest without a reference to the importance of correct articulation in securing the best results from artificial teeth. But as this part of the subject is of itself a broad field for study I will only emphasize the fact that in order to insure the greatest usefulness of the denture it is necessary to conserve the forces that operate to prevent its dislodgement by so arranging the articulation as to direct the force of mastication as nearly as possible in the line of the greatest resistance.—*Items.*

FRACTURES OF THE LOWER JAW. By Henry C. Boenning, M.D., Philadelphia. Read before the New Haven Dental Association, March 15, 1904. Fracture of the jaw-bones is of much interest to the dental practitioner, because the most frequent sequel to this injury is the loss of normal occlusion, whereby the teeth are thrown partly or entirely out of commission as organs of mastication. Fracture of the lower jaw stands fifth in the entire series of fractures of the skeleton. Fracture of the upper jaw is relatively a rare occurrence, and is always the result of violence directly applied. Fractures of the lower jaw are generally the result of violence; occasionally they are the result of muscular action. Of course when disease invades the bones fracture occurs with greater ease. In tabulating 1,338 fractures of the lower jaw collected from various hospital reports, I find that 148 occurred in women and 1,190 in men; or, in a general way, fracture of the lower jaw is more than eight times as common in men as in women. This is readily understood when we consider the larger exposure of men to injury in the trades and occupations.

It is not my purpose, however, to take up a description of fracture of the lower jaw didactically, but rather to present some views on certain practical features pertaining to this fracture not ordinarily discussed in books. Fractures of the lower jaw are clinically best considered, first, as those of the body of the mandible, and second, those of the rami and their processes. Fractures of the body of the bone are almost universally compound, due to the deep penetration of the closely set tooth-sockets and the dense adherence of the gum structures to the periosteum.

*Forces Determining the Point of Fracture.*—They are also frequently bilateral, and in every case of fracture of the lower jaw that is brought to the hospital for treatment it is the rule to make a most careful examination for fracture at some other part of the bone. The rule reads, "Always look for fracture number two." This occurrence is readily understood when we consider the shape of the inferior maxillary bone. When violence is applied directly to the point of the chin it is common to have bilateral fracture near the mental foramina, due not to the impact of the blow alone, but also to the resistance of the condyles in the glenoid cavities and to the muscular control of the rami. When the blow is received on the chin the powerful elevator muscles of the lower jaw instantly con-

tract by reflex and fix the jaw. Thus the force from in front meets the force of resistance behind, causing a recoil of vibration, and fracture at the weakest point or points of the bone results, and is often bilateral.

A very simple illustration of these forces is seen when you take a clay pipe-stem, stand it on end on a hard surface, and tap the free end with a piece of stone or other hard material. When the blow is sufficient the pipe-stem breaks somewhere near the middle, rarely near the ends. As the vibrations are almost instantaneous in transmission, we demonstrate that the fracture of the pipe-stem is the effect of two forces—the direct and the recoil.

Where the violence is expended at the side of the body of the jaw-bone, and is of such force as to crush through the bone, its continuity is at once destroyed and a second fracture is very rare, but if the force be less severe a fracture may result at or near the point of violence, with another at the opposite side, at an entirely different part of the bone. Thus in a case at the Garretson Hospital, admitted in January last, a fracture of the body on the right through the cuspid socket was associated with oblique fracture through the lower part of the left ramus. In the case of a professional boxer, brought to the hospital one night last fall and admitted to the ward, suffering from concussion of the brain—the result of the "punch soporific"—it was found the next day that the jaw was stiff, and violent pains, especially on the left side, followed attempts at opening the mouth. A careful examination showed a fracture through the neck of the right condyle, and on the left side a vertical fracture of the ramus. As the teeth of the left side were unimpaired, as far as sensation was concerned, it was decided that there was no involvement of the inferior dental canal or nerve. It is not an exaggeration to say that these fractures represent the sum of the forces of direct violence and of recoil. It is a well-known clinical fact, and one admitted by every surgeon, that a blow at the side of the head is sometimes followed by fracture of the opposite side, without injury at the point of violence. It often occurs that a blow at one side of the head is without effect on the skull, but produces contusion and laceration of the meninges and brain substance opposite to the point where the violence impinged. Here the forces of vibration meet, and the fracture or other injury is the result.

Many years ago, when I first took up this question and expressed my belief that mandibular fracture—like the *contre-coup* fracture of the skull, where the force may be said to be applied at zenith and the fracture occur at nadir—was the result of opposing forces of vibration, I received no encouragement in taking that position; closer investigation, however, has convinced a number of those who differed with me that my views were correct. It was especially pointed out to me then that the parabolic curve of the lower jaw would disseminate the vibrations of force. Certainly it would project them into infinite space were the jaw separate from the skull and a mere bone in the hands of the student of anatomy, but by virtue of its articulations and dental occlusions it forms with the skull an oval which serves for the transmission of force with the same effect as the cranial ellipse.

*Direction of the Fracture.*—The direction of the line in complete fracture is interesting. Through the body it is almost uniformly oblique. The only vertical fracture of the body of the lower jaw that I ever saw was in a child six years old, in which case, as the result of a fall, there was separation of the two halves of the bone at the symphysis. In this case there was probably delayed ossific union, and it may be likened to the transverse fractures of long bones through the epiphyseal cartilage. The line of fracture is often angulated; thus a vertical fissure through the process deflects at the body and continues at an angle obliquely through the body of the bone. The reason for this is that the fracture line is through the path of least resistance.

*Fracture Due to Muscle Force.*—Muscle force is seldom accredited with being an active factor in fracture of the lower jaw. A case—that of a woman of sixty-four—sent to me by a practitioner of Trenton, had bilateral fracture through the body of the mandible in the molar region. The patient slipped on the ice, fell forward on her hands, threw her head back strongly, and landed on her shoulder and side. Her face did not strike the pavement. When helped to her feet she was alarmed to find her mouth bleeding. In this case the involuntary reflex of the elevator muscles acted with great force, and bilateral fracture resulted. It is but fair to add that some of the lower molars had been removed, and this condition at her time of life facilitated the fracture. In the early part of this paper I spoke of instantaneous muscular reflex in response to a blow on the jaw. But here is muscular action the result of

mind-action, involuntary as far as the individual is concerned, but nevertheless in response to the sense of preservation which is resident in every cell of the human body. Every portion of our organism is in a state of latent apprehension. A common illustration of this is the action of the eyeball in retreating deeply into the orbit at the approach of threatened injury. Here the latent apprehension of the muscles has been quickened by some mental act of which the individual is personally unconscious, and the eye has been pulled back of the protecting orbital ridges. These acts of unconscious cerebration for the preservation of the organism are probably functions of the subconscious mind, that sees and acts before the conscious mind perceives—but I must confine my paper to fractures of the jaw, and I will not follow the temptation to discuss matters psychological, and therefore will but touch on that which concerns its association with the actions of the muscles of the jaw. Severe convulsive muscular action has often caused fracture of the bones of the skeleton, and there are a few recorded cases of fracture of the mandible.

*Treatment of Mandibular Fracture.*—The treatment of fractures of the lower jaw is widely discussed in the text books, and the result of such treatment is generally said to be entirely satisfactory. From the number of cases of malocclusion and mandibular deformity following fracture that have been brought to my notice, and from personal experience, I hold that treatment of fracture of the lower jaw is difficult, requiring much care and skill, and even then is often followed by troublesome sequelæ. Perverted alignment, ununited fracture, osteomyelitis from septic infection, deformity, caries, necrosis, disease, and loss of teeth, are oftener seen than perfect results. Nor are my deductions local or limited. From careful inquiry I find that unsatisfactory reports on the treatment of fracture of the lower jaw are abundant throughout the surgical world. Five years ago I addressed a letter to about a hundred representative surgeons in this country and abroad, asking their personal experience in the treatment of the fracture under discussion. I received a number of answers, and with one exception all stated that perfect results were difficult to obtain. At first sight this seems to be without warrant, but when we consider that fractures often occur in jaws more or less distorted or changed by the loss of teeth, it is more easily understood. Now and then we are called upon to treat a case in a subject who is edentulous.

The means used in treatment are various. Splints are used both within the mouth and applied externally. Operations for wiring, fixation of fragments by metal screws or by a pin of some animal material properly asepticized, are growing in favor. The mouth-splints in use, such as the Hammond, vulcanite interdental prop, the Angle apparatus, and others, are familiar and useful appliances in many cases, but not infrequently fail to keep the fragments in position. Of the splints named I prefer the Hammond wire splint carefully adjusted. The danger in all splints attached to the teeth, or exerting pressure thereon, is that they bring about a certain amount of leverage by approximating the alveolar end of the fracture and thus separating or displacing the line of fracture through the body of the bone. This permits the intrusion of shreds and other soft tissue, and non-union is often the consequence. Another objection to splints within the mouth is that they interfere somewhat with mouth sanitation.

*Surgical Treatment of Mandibular Fracture.*—In fractures of the body of the mandible it has been my aim and practice to discard all splints. I cut down upon the fracture, remove the shreds of tissue and clot if any, and drill through each fragment, then silver wire of No. 18 or 20 gauge is threaded through the drill-holes. The fragments are then accurately approximated, the wire twisted together tightly, and the resulting wire knot is bedded firmly against the bone. The wound is then closed, strict antisepsis being carried out. The advantages of this line of treatment are obvious. Mouth sanitation can be enforced, there is perfect apposition of the ends of the fragments, and hence much lessened tendency to complications and subsequent deformities. Where the fracture is comminuted small loose fragments had better be removed, but larger fragments, although loose, should be left *in situ* and wired. The osteogenetic function of the periosteum provides as a rule ossific deposits sufficient in such cases to bring about a good result, and where the wiring has been accurately done, and the fragments are immobile, a good result should follow.

*Care in Post-Operative Buccal Antisepsis.*—Of equal importance with accurate coaptation of the fragments and immobility is mouth sanitation. No matter how perfectly the bone has been set, should infection occur serious results will follow, for infection is the foe of good union. The most painstaking care should be exercised in keeping the buccal cavity surgically clean. The dental practitioner

by means of rubber dam isolates teeth requiring his services, and can thus asepticize his field of operation. The oral surgeon cannot secure asepsis of the mouth. Though he may filter the air entering the air-passages, he cannot close the buccal cavity behind; hence the mouth is constantly contaminated from pharyngeal, alimentary and nasal communications. But he may wonderfully improve the degree of buccal cleanliness, by correcting stomach irregularities by means of laxatives and proper feeding, also by flushing the nose with saline and mildly antiseptic solutions. The nasal meatuses are a veritable hotbed of germ life, and it is imperative that they should be kept clean. The use of antiseptic gargles and mouth-washes will be of great service. Brushing the teeth when fracture of the jaw exists had better be omitted. The nurse may substitute interdental injections of hydrogen dioxid, followed by stronger antiseptics. The wound communicating with the fracture should be thoroughly cleansed as often as necessary, and if possible dressed with sterile borated gauze.

I have often tried to seal up the buccal wounds in fracture with iodoform-collodion, but frankly confess that I was unsuccessful. One of my assistants devised a wire shield that could be bent down upon the dressings and kept in position by ligating to the adjoining teeth. This cap was quite efficient in keeping the dressing in place, but it became speedily offensive and caused so much annoyance to the patient that it was removed, to prevent the tongue from pushing it out of place, with the possible danger of disturbing the fragments.—*Cosmos.*

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PHILOSOPHY OF THE ADHESION OF VULCANITE TO METALLIC BASES. By Walter M. Bartlett, D.D.S., St. Louis. Read before the St. Louis Dental Society. At the beginning of 1840 artificial teeth were mounted almost entirely upon metallic bases by means of soldered backings or post anchorage. A few years later Dr. Allen introduced continuous gum, which gave to the profession a class of work by which artificial teeth could be mounted upon a platinum base by first soldering the teeth to the base and then fusing around them a porcelain body. With this class of work the restoration of lost contour could be accomplished. At a later date vulcanizable rubber was introduced into dentistry, giving to the profession a method of constructing a denture which marked the beginning of a downward trend in the line of dental prosthesis. Dr. Allen origin-

ated a class of work which when properly constructed was all that could be desired in the way of art and utility, requiring the best efforts of the skilled mechanic and an artistically trained eye. When Dr. Evans made use of vulcanite for the construction of an artificial denture he placed in the field a cheap competitor against the one advocated by Dr. Allen.

Before entering upon the work proper to my subject I will touch lightly upon the history of vulcanite. The exact date of the introduction of vulcanite for dental use is veiled in some doubt, but we know that some time between 1844 and 1855 it first began to be employed. In 1851 Nelson Goodyear's process for making vulcanite was published and turned the attention of manufacturers to the adaptation of this material, which was announced to be a substitute for horn, bone and ivory, susceptible of being colored, having the plasticity of gutta-percha or caoutchouc, and being exempt from the action of heat, cold and acids. In 1855 Charles Goodyear, Jr., obtained in England a patent for making a dental plate of hard rubber, although it has been claimed that the late Thomas W. Evans produced a vulcanite denture in 1845.

To accomplish a result with vulcanite did not require the skill, expenditure and judgment necessary to manipulate the other, and consequently the profession rushed madly to this cheap base, using it entirely or in combination with metallic bases for the attachment of teeth. This method of combining the two has been in use for upwards of fifty years, and yet I know of hardly a theory which has been advanced stating why such a combination is possible.

Vulcanite is produced by incorporating a given amount of sulphur with caoutchouc, the proportions varying according to the uses for which the vulcanite is intended after induration. This given amount of sulphur incorporated with caoutchouc to produce the vulcanite used for dental bases no doubt varies in the formulas of different manufacturers. Assuming this to be the case, I endeavored by correspondence to ascertain the amount of sulphur incorporated with the caoutchouc from some of the different manufacturers of vulcanite, but in all cases they were loath to give the information, so in conducting my experiments I was forced to rely upon the formulas given by Dr. E. Wildman and upon my own investigation.

It was first necessary to supply myself with all those metals necessary for prosthetic work, both practical and technical. Then I had

to determine upon some method of obtaining definite practical data in regard to the amount of pressure or weight necessary to bring about a separation of the vulcanite and metal employed. A perfect mould constructed of gun metal was procured, which contained four depressions measuring ¾ of an inch in diameter by ¼ of an inch

| METALS. | Weight of metals, grains..... | Loss in metal, percentage..... | Adhesion, lbs..... | REMARKS. |
|---|---|---|---|---|
| Twenty-four-k. gold. | 22.7 | None. | None. | Rubber polished, no change on metal. |
| Coin gold..... | 20.6 | None | None | Metal and rubber, polished surface. |
| Twenty-k. gold..... | 20.8 | None. | 35 | Metal slightly tarnished, rubber polished. |
| Eighteen-k. gold. .. | 24.7 | None. | 140 | Metal tarnished, rubber polished. |
| Pure silver..... ... | 14.3 | 42 | None | Metal partly destroyed, rubber soft and rough surface. |
| Coin silver..... | 14.1 | 5 | None | Metal heavily tarnished, rubber soft and rough surface. |
| Platinum ..... .... | 26.5 | None. | None. | Metal and rubber, highly polished surface. |
| Aluminum..... | 39 | None | None | Metal and rubber polished. |
| Zeller's aluminum... | 16 | None | None. | Metal and rubber polished. |
| Magnalium..... | 21.4 | None. | Slight. | Metal polished, rubber slightly tarnished and polished. |
| Dental alloy..... | 14.7 | None. | 5 | Metal slightly tarnished, rubber polished. |
| Nickel..... | 11.7 | None | None. | Metal and rubber tarnished. |
| German silver..... | 11.7 | None. | 7 | Metal polished and tarnished, rubber polished and tarnished. |
| Victoria metal..... | 12.7 | None. | 10 | Metal tarnished and polished, rubber tarnished and polished. |
| Iridiumoid ..... | 10.6 | None. | None. | Metal partially tarnished, rubber partially tarnished. |
| Copper..... | 9.9 | 33 | None. | Metal partially destroyed, rubber soft and heavily tarnished. |
| Brass..... | 14.4 | None | 10 | Metal polished, tarnished surface; rubber partially tarnished and polished. |
| Goldoid..... | 21.1 | 1.65 | None. | Metal tarnished, surface flaked off; rubber tarnished. |
| Weston's metal..... | 52.5 | None | None. | Metal tarnished and polished, rubber highly polished |
| Tin..... | 63.7 | None | None. | Metal tarnished and polished, rubber polished. |

in depth. In the center of the base of the mould a depression was made to receive the islet contained upon the disk. The rubber utilized in these experiments, according to a recent analysis made by Dr. Prinz, contained twenty-five per cent sulphur. The various

metals were cut into disks and squares measuring ¾ of an inch in diameter. With the exception of aluminum and its alloy, tin and its alloy (Watt's metal), these disks were supplied with a soldered islet. The rubber was carefully packed into the mould, facing the polished surface of these various metal disks, and the so-packed mould was then vulcanized at a temperature of 320° for one hour. The object of this experiment was to attach the weight to the combined rubber and metal plate by means of a spring scale, and thus find out the amount of pressure or weight necessary to cause a separation between the two bases to determine the amount of adhesion.

The rubber used in the moulds weighed prior to vulcanization 183 grains, after vulcanization 179 grains, indicating a certain loss, which during the process of vulcanization, being practically a dry distillation, can be accounted for only in this loss of its specific gravity, being simply a liberation of sulphuretted hydrogen resulting from the action of the hydrogen atoms of the hydrocarbon upon the sulphur present in the vulcanite. Quite an important change in regard to the weight of certain metals before and after vulcanization occurred.

From this table two important factors can be deducted—first, loss of weight in certain metals; second, the amount of adhesion between certain metals and vulcanite. Practically only two metals (silver and copper) showed, according to the above table, a material loss. Pure silver lost 42 per cent, coin silver 5 per cent and copper 33 per cent. Goldoid, an alloy of copper and nickel, lost 1.65 per cent. The loss of silver during the process of vulcanization is a well-known fact. This phenomenon may be simply explained, from a chemical point of view, by the fact that sulphur in the form of sulphuretted hydrogen possesses a great affinity for silver. As stated above, during vulcanization dental rubber liberates sulphuretted hydrogen *in statu nascendi,* which in turn attacks the silver metal base, thus rendering it unfit for practical purposes. This same chemical reaction, only in a slightly milder degree, occurs when rubber is vulcanized upon a copper base. The free sulphuretted hydrogen will destroy the copper and form sulphid of copper, which, analogous to the above-formed sulphid of silver, will prevent the rubber from becoming "vulcanized," leaving it in a peculiar soft consistency.

It is rather remarkable to observe that in coin silver, being an

alloy of nine parts of silver and one part of copper, this loss amounted to only 5 per cent, while each individual metal lost the following percentage: Pure silver 42 per cent, and pure copper 33 per cent. Dental alloy, consisting of approximately one-third of platinum and two-thirds of silver, and much used as a metallic base for dentures in England and Continental Europe, showed *no* loss. The significance of the loss of copper is of less importance to the dental practitioner, as this metal is not utilized for artificial substitutes in connection with vulcanites. However, it is of importance to the teacher of dental prosthesis, as the copper is frequently employed in the technic teaching in dental colleges. Another remarkable fact developed in this connection in regard to the loss of copper and silver under the above treatment. While copper and silver lost a rather large percentage when employed separately, that same loss was greatly modified when alloyed together, as in the form of coin silver.

A second and more important factor can be further deducted from our table. It is the relative amount of adhesion formed between the vulcanite and the metal bases. By looking over the table we find the following data recorded:

| | | |
|---|---|---|
| 18-k. gold plate, | 140 lbs. | weight necessary to break adhesion. |
| German silver, | 7 lbs. | weight necessary to break adhesion. |
| Victoria metal, | 10 lbs. | weight necessary to break adhesion. |
| Brass, | 10 lbs. | weight necessary to break adhesion. |
| Dental alloy, | 5 lbs. | weight necessary to break adhesion. |

The above are alloys possessing approximately the following composition:

| | | |
|---|---|---|
| 18-k. gold plate ..... | pure gold ..... | 75%. |
| | silver ..... | 15%. |
| | copper ..... | 10%. |
| German silver ..... | copper ..... | 58%. |
| | zinc ..... | 30%. |
| | nickel ..... | 12%. |
| Victoria metal ..... | copper ..... | 50%. |
| | zinc ..... | 30%. |
| | nickel ..... | 20%. |
| Dental alloy ..... | platinum ..... | 33 1-3%. |
| | silver ..... | 66 2-3%. |
| Brass ..... | copper ..... | —%. |
| | zinc ..... | —%. |

If we look over this table very carefully we are forced to con-

clude that a certain amount of silver, or a certain amount of copper, or an alloy of both in the approximate proportions of two parts of silver to one of copper, must be added to those metal bases which form no union with vulcanite (gold, platinum, nickel, etc.) if we wish to bring about an adhesion between the metal base and the rubber. If we keep in mind that neither silver nor copper will unite with rubber—nay, will be partly destroyed in itself and prevent even the rubber from becoming thoroughly hardened during vulcanization—it seems *a priori* paradoxical to attribute to these metals a favorable influence upon the union of the two substances. Considering, however, a metal base alloyed with a silver-copper to the extent of about 25 per cent in its union with vulcanite, from a chemical standpoint, we may become convinced of the soundness of the following theory, which I offer in explanation of this remarkable phenomenon. During the process of vulcanization of rubber upon metallic bases other than silver and copper, but alloyed with these two metals in certain proportions, the liberated sulphuretted hydrogen in its nascent state acts upon this silver and copper alloy, forming respectively silver and copper sulphids. This chemical removal of the alloy from the metal base will leave the surface of the base in a more or less pitted condition, and this fresh, rough surface offers a suitable place for the ready adhesion of the vulcanite to the metal. Whether the sulphids of silver or copper in their *statu nascendi* are instrumental in bringing about a closer union is, in my mind, doubtful. If this were the case vulcanization upon pure silver and pure copper would not be failures.

From the above experiments we find that there is sufficient adhesion of vulcanite to 20-k. and 18-k. gold for all practical use, were it not for the fact that there is in time a change occurring in the vulcanite which, as it contracts upon itself, becomes detached from the metal base; so to obtain the best results it is necessary to aid adhesion of vulcanite to the metal base by roughening the contact of the base, attaching soldered pins or loops so they can be finally imbedded in the indurated rubber. Great care should be taken in placing the wire finish, both labially and lingually, to form an underhold for the lodgment of the vulcanite.—*Era.*

PROBLEM OF DENTAL CARIES. By Stanley Colyer, M.R.C.S., L.D.S., London. There can be little doubt that the pathology of dental caries, so ably investigated by Miller and confirmed subsequently by many workers, rests upon a sufficiently firm basis to allow it to be the starting point of further investigations. But it must not be lost sight of that the result of Miller's work was to establish the pathological and not the etiological side of dental caries, and that we still have to discover, as Goadby says, "the ultimate liberating cause too often overlooked in the multiplication of predisposing ones." In other words, we still have to discover what change or changes have taken place in the environment of man or in his constitution that have rendered it possible for the micro-organisms in his mouth to form acids capable of dissolving the enamel of his teeth.

Is it due, as some would have us believe, to a change in the structure of man's enamel whereby his teeth are becoming progressively more susceptible to these acids? In the first place there is no proof that this continual degeneration is occurring. True it is that teeth vary in structure, partly because everything in nature does vary, and partly and chiefly owing to the fact that mothers, neglecting the chief duty of their life, have to a great extent ceased to nurse their infants, and in its place, misled by advertisements of patent foods, and by the ignorance of "nurses and the prejudiced counsel of grandmothers," have substituted methods which have undermined to an immeasurable degree the health of the present generation. This important side of the subject has been clearly demonstrated by Dr. Kingston Barton, who, after carefully collating his cases during the last twenty years, has been able to show the relation of correct infant feeding to decay in teeth. It will thus be seen that this latter change in structure of the teeth is an acquired characteristic due to improper nursing, and not, so far as we can ascertain, a characteristic that can be handed on from parent to child. It is possible that the slight natural variations might by a process of selection be transmitted from one generation to another, but it is probable that this need not be considered an important factor, and that in this as in many other troubles which we suffer from we have ourselves chiefly to blame.

In the second place, as there is no doubt that all forms of enamel can be decomposed by lactic acid, it is difficult to see how any teeth

can be immune to caries. The real effect of structure will be to vary the rate of the carious process, but not the incidence of it. Naysmith membrane has, it is said, been much neglected, and we are asked by Mr. Hopewell-Smith to regard it as the first line of defense against the ravages of the acid. This membrane is resistant to acids, but so far as we know there is little reason to believe that it prevents the diffusion of fluids through it, and if so, what is to prevent the lactic acid passing through this very imperfect line of defense and attacking the enamel on the other side.

Is it due, as T. G. Read holds, to the use of bread made of roller-milled in place of bread made of stone-milled flour? The question is one of much interest and cannot be dismissed without a thorough investigation, but at present the report of the matter is so meager and incomplete that it is impossible to criticize it except in a general way. As the case now stands, we have it on good authority that there is an increase of 40-43 per cent in acidity when bread made of roller-milled flour is thoroughly chewed in the mouth compared to thoroughly chewed bread made of stone-milled flour. In one case I find that the estimation was made a quarter of an hour after the process of chewing. It will be observed that the nature of the acid is not stated, and that no reasonable explanation has been offered to account for the difference. It is almost impossible to believe that this increased acidity occurs during the chewing—in other words, that it is a change brought about by microorganisms. Is it not more probable than the bread itself is more acid, and that similar results would have been obtained if the two kinds of bread had been extracted with water? We know that the process of "raising bread" is nothing more than an alcoholic fermentation, and that one of the by-products of such fermentation is succinic acid. Is it not therefore more reasonable to believe that the increased acidity of the bread made of roller-milled flour is due to the fact that a large proportion of the earthy salts having been excluded by the miller the succinic acid remains unneutralized? Further, what is the concentration of this acid? What is its nature? Is it succinic acid? Is it lactic acid? Were this question of so much importance, should we not expect to find the teeth of the rich far worse than the teeth of the poor, who do not eat the more highly refined bread? But is this so? Among adults I think not, and among children I have no hesitation in saying that the opposite state of affairs most distinctly

obtains. These and many other criticisms have occurred to me since reading Mr. Read's paper, and though I am far from denying the importance of his discovery, yet I doubt whether it can be given the prominence he desires for it as the main cause of the recent increase of dental caries.

Next I wish chiefly to refer to the theory of Dr. Sim Wallace, who believes that "The cause of the present-day susceptibility to dental caries is that the natural foodstuffs are to a large extent deprived of their accompanying fibrous parts and prepared and consumed in a manner which renders them, especially the carbohydrates, liable to lodge and undergo acid fermentation in the mouth, while from the same cause and the induced conditions the acid-producing microorganisms of the mouth lodge and multiply and augment the rapidity and intensity of the acid fermentation." There are certain difficulties in accepting this theory. In the first place there are many people, both in civilized and uncivilized countries, who do not live upon hard food, and yet do not show much susceptibility to caries. Thus in Galton's book on "Heredity Genius" I read: "A Chinaman lives and has lived for centuries on rice and spoon meat and such overboiled diet as his chop sticks can deal with. Equatorial Africans live to a great extent on bananas or else on cassava [Cassava is a nutritious substance like starch obtained from the Cassandra plant. Tapioca is a finer preparation of cassava], which being usually of the poisonous kind must be well boiled to destroy the poison before it is eaten. Many of the Eastern Archipelago islanders live on sago. Pastoral tribes eat meat occasionally, but their usual diet is milk or curds. It is only the hunting tribes who live habitually upon tough meat." Yet it is well known that among these nations caries is not extensive. Secondly, there can be no reasonable doubt that in masticating even the hardest carbohydrate food some particles of starch must remain lodged and be liable to ferment. Again, if caries were due only to the lodgment of food it would be more irregular in its distribution, and would not occur at spots where food is unable to collect, namely, in normally arranged teeth at and just around their points of contact. Thirdly and lastly, although Dr. Wallace states that foodstuffs are "prepared and consumed in a manner, etc.," he does not say why food in a soft stage should be more fermentable. I cannot see that he has brought forward any evidence in proof of this portion of

his theory which I have quoted above; it is a general statement, and leads us no nearer the solution of the truth than such an expression as "unhygienic habits of life," using hygiene in its broadest sense.

Reduced to the simplest possible statement, three factors are necessary in the causation of dental caries; the microorganisms, the saliva, and the carbohydrates. Firstly, the microorganisms. We know that the mouth teems with organisms, many of them capable in some way of producing acids from starchy substances. It has been shown by many observers that not one but several varieties of mouth organisms are capable of bringing about this acidic change, so that it is impossible to give to any one variety the position of being the particular organism of dental caries; in other words, there is no specific organism. Secondly, the saliva. In the case of saliva there is no reason to doubt its variability. It is possible to imagine that some slowly accumulating cause, or even some abruptly occurring one, as has been suggested by Herbert Spencer in the case of vaccination, may have brought about a constitutional change in the body of many, and so have altered the environment of the organisms by producing a variation in the nature of saliva. There is no doubt that diseases come and go; scarlet fever, for instance, appears to be slowly dying out, and syphilis is said to be less virulent than formerly, owing to the race through succeeding generations having acquired a partial immunity. But however true these arguments might be for localized areas, even for continents, the same would not hold good when we considered the world-wide distribution of caries. It is impossible, I think, to explain caries along these lines; at the best we can regard them only as predisposing causes which help the action of the true one.

Thus by a process of elimination we are driven to believe that the real cause lies in the carbohydrates, and so it behooves us to consider carefully the nature and properties of this class of foodstuffs. They fall conveniently into three groups—(1) *The Monosaccharides, or simple sugars,* such as glucose, fructose, arabinose, etc. (2) *Polysaccharides, or complex sugars, resembling sugars,* such as cane sugar (sucrose), milk sugar (lactose), and maltose. (3) *Polysaccharides, not resembling sugars,* such as cellulose, starch and gums. In its popular sense sugar is generally understood to mean the product of the sugar cane and the beet (sucrose or saccharose), but in its broad commercial sense sugar includes not only the

sucroses but the monosaccharides, that is, the hexoses or glucoses—the grape-sugar group, sugars with six carbon atoms in the molecule—whether obtained naturally or by the artificial conversion of the polysaccharides. Between sucrose obtained from beet and that obtained from sugar cane there appears to be a definite physical difference, which chemical analysis has so far failed to discover. Children and consumptives, it is said, fatten better upon cane than beet sugar. Dr. Colin Campbell says, "Low beet sugars or treacles cannot be used with satisfactory results, even as cattle food! Bees refuse to feed even upon the good grades of grocery beet-sugar; they turn it out of their hives. I know of a case in the north where the bees, having nothing else, partook of some, and suffered from severe diarrhea in consequence, many dying of it!"

Of the important class of monosaccharides, especially the glucose group, I have rather more to say. They occur naturally in fruits, in honey, in grapes, in germinating seeds, etc., and they may be artificially prepared by heating the polysaccharides, either the sucroses or the celluloses, with dilute acids. By this means is produced annually an enormous quantity of starch sugar, and as time goes on doubtless the output will become more and more. The cost of production of this starch sugar is small. Even so far back as 1885 it could be produced at 1 cent a pound. Its use is wide; as an adulterant to cane-sugar it can be mixed in any proportion without altering its appearance, and thus proves itself profitable in the hands of unscrupulous dealers. In addition to this it is used in the manufacture of "table syrups," of candies, of toffees, of artificial honey, of preserved fruits, of jams, and of marmalade—in fact, it may be used in most forms of sweet produce, and more especially those in which crystallization is to be avoided. Moreover, it is used by brewers and vinegar-makers, by wine and spirit-makers, by tobacconists, and for many other purposes, some legitimate, others not. I have given the above list in order to emphasize its widely-spread use, and to show how impossible it is to avoid the fermentable sugars in one's manufactured food.

Turning now to the question of alcoholic fermentation, we find important differences. Thus the sucroses and the starches are not directly fermentable, but must be converted by some means, either by microorganisms, by animal ferments, by heating with dilute acids, or simply by prolonged heating, into sugars of the glucose

group. In this change an important substance is formed, one upon which I wish to lay particular stress—dextrin, a gummy body, intermediate between the starches and the glucoses. Much the same conditions appear to obtain in the case of lactic acid fermentation, but the subject has not at present been given much attention. It would appear that all carbohydrates, under given conditions, are changed by fermentation into acids, so it is possible to imagine that, given these conditions, they could all produce caries. There is one other point, the importance of which appears to have escaped most observers, and that is that the polysaccharides are more resistant to the lactic acid ferment than the monosaccharides, and that consequently acid is produced in a shorter time from the latter than the former. Here also, as in the case of alcoholic fermentation, it appears necessary for the more complex sugars to be changed into the less complex before the essential lactic acid change can occur. In "table syrups," and in certain cheap sweets, such as gums, stick-jaws, toffees, etc., there is often a large percentage of gummy substance, so that we have a product which undergoes the lactic acid change easily and quickly, and in addition possesses an increased adhesiveness and a decreased diffusibility. In some cases also commercial glucose is acid, due no doubt to imperfect purification; therefore, the possibility of the acidity of various foodstuffs of which it forms a part must not be lost sight of.

Sugar, for some reason or other, has never been given the place of importance in this question which I believe it deserves. It has always been said that, being so soluble, it remained but a short time in the mouth, and left it long before acidic changes could occur, and as if to clinch the argument it was triumphantly shown that in countries where the sugar-cane was grown the natives, although they sucked the cane, did not suffer from caries. Sim Wallace has recently attempted to explain this apparent anomaly by saying that he believes the immunity of the natives is due to the fact that they at the same time chew the cane, which has a cleansing action upon the teeth. But is it not obvious that if the chewing or sucking is continued long enough the whole mouth will be bathed in a saccharine fluid, and between the teeth, at the points where they are nearly in contact, this fluid will be firmly held by capillary attraction, and however thorough the chewing, and however much saliva follow it, it will be many hours before the mouth is thoroughly

free of sugar, and this is assuming a most thorough chewing, not followed by a subsequent one, for some hours? Is it not therefore more rational to suppose that the immunity of the native is due chiefly to the facts that sugar-cane does not quickly undergo the lactic acid change, and that, practically speaking, containing no dextrin, a slow diffusion between it and the saliva occurs, which is sufficiently rapid to take place before the acidic change. Contrast this with the case of a poor child sucking cheap sweetmeats. With a limited pocket and an unlimited desire for sweets, the poor child affects chiefly those which have the greatest lasting property, such, for example, as "jujubes," "stickjaws," "gums," "caramels," and so forth, in other words, the less soluble and those containing the largest quantity of gummy material. The process of sucking is often a long one, at times extending over several hours, and not infrequently only completed as the child falls asleep. Imagine for one moment the condition of things in this latter case—the whole mouth is covered with a thick glutinous covering of glucose, the saliva ceases to flow, the movements of the tongue cease, and thus for some hours the microorganisms are given a clear field for their efforts. In adults and older children the conditions are somewhat different. In them, if sweets are sucked long enough for the saccharin fluid to collect between the teeth, it may be hours before the saliva is able to diffuse and dilute those portions sufficiently to render them harmless; moreover, they are at spots inaccessible to the tooth brush, and dislodgeable only with difficulty and patience, by swilling fluid about the mouth. How much more pernicious at night time, when the diluting action of the saliva is at its minimum, for the sticky substance will remain between the teeth, even after a thorough cleansing with the brush! Does this not explain why decalcification of the enamel in its early stages occurs at the point of greatest capillary attraction, and of least accessibility to particulate foods?

I have been led to the above conclusions by observing certain peculiarities in appearance which caries may exhibit in the mouths of children. Broadly speaking, these appearances fall into two groups: Those in which the whole of the crown of the tooth seems to have been dissolved away, and those in which caries is chiefly interstitial. In considering the former variety, which occurs chiefly in dirty mouths, it seemed to me that the cause acting must be one which destroyed the whole of the upper surface of the tooth at the same time, and for such to take place the tooth must be bathed in

an acid solution for an appreciable time, and thus could not have been due to lodged food, or the caries would have been more irregular, but rather to dissolved food. When I considered the question of interstitial caries the same conclusion was forced upon me. Who has not observed in mouths of the utmost cleanliness how caries, eluding all, attacks the fissures and the spots when the adjacent teeth are almost in contact. Caries at and around the point of contact is, to my mind, one of the proofs that the early stages of the condition are not caused by lodged food, for the reasons that food cannot lodge there, and food in the earliest stages of decay is not found there. If we examine a little more closely this point on the tooth where caries so frequently commences, we observe that the actual point of contact may not be decalcified, but that around it, exactly corresponding to the area where fluid would be held most firmly by capillary attraction, the destruction is in progress. If this spot were due to lodged food it would not show this marked regularity; but as it is probably due to dissolved food the explanation is simplified.

There is one other important subject I wish briefly to refer to. I shall be asked how is it that caries existed so far back as the "Stone age," that it was apparently fairly common in the "Bronze age," and that it was still more common among the Egyptians, the Romans, and the Anglo-Saxons? If we allow for the probable inaccuracy that must come from the small number of skulls available for examination, and the very small number, comparatively speaking, examined, it is strange how very definite is the increase of caries as we pass from the earliest time down to the present day, and it is this regular increase which gives us a clue to the cause which I doubt not will be shown to follow closely the increase of fermentable sugars in man's diet. It may be taken as a general truth that the more civilized a man becomes the more attention he pays to his food. So when man, emerging from his animal state, taught himself after many thousands of years the art of shaping stone implements, no doubt his fastidiousness in food had increased, and from the time he discovered the art of cooking, or enjoyed the sweetness of a germinating seed, from that moment he increased the amount of fermentable sugars and soluble starches in his diet, and rendered himself more liable to caries. There can be no doubt that a mistake has been made in the past in regarding all sugars as similar,

and that in the future, in their relation to caries, they must be looked upon as different substances transformable to some extent into each other—just as peptone, being a proteid, is a changed form of other proteids, though possessing many different properties. Whether or not I am right in saying that the main cause of caries in man throughout all time has been due to the introduction of the more easily fermentable carbohydrates into his diet, and the more recent increase due to the introduction and widely-spread use of artificial glucose, remains for the future to settle. If it be so, then at least we may have reason to believe that an almost complete prevention of caries is not a hopeless dream, but one well within a reasonable range of possibility.—*Record.*

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PRACTICAL THERAPEUTICS—PERIDENTAL INFLAMMATION. By J. P. Buckley, Ph.G., D.D.S., Chicago. Before discussing the therapeutics of pericementitis, I desire to state that this condition is too frequently produced by carelessness on the part of dentists. The cause of many cases of peridental inflammation can be traced to the misuse of drugs, ill-fitting crowns and bridges, malleting, faulty occlusion, etc. However, it is not always possible to perform dental operations successfully without irritating this susceptible membrane.

There are many circumstances which modify the effect of drugs, causing them to act differently upon different individuals, and especially upon different tissues of the body. Occasionally the peridental membrane becomes highly inflamed and extremely sensitive from the action of arsenic. In the removal of pulps by pressure anesthesia care should be taken to use a sterile solution and have the dentin well sterilized, also avoid forcing the solution further than is necessary to painlessly remove the pulp. As was stated in my article on "Sensitive Dentin," cocain is a protoplasmic poison, and if forced through the apex of the root into the tissue beyond, even though the solution be sterile, pericementitis will always follow. At least this is my experience in the use of this method of removing pulps. A frequent cause of this condition is microorganisms that have escaped from a putrescent root canal or that have been introduced by the removal of the pulp tissue. This particular kind of pericementitis is known as *septic pericementitis,* and is closely associated with *incipient abscess;* therefore the treatment will be considered under this heading in a later article.

As has just been stated, a common cause of apical pericementitis is the injudicious use of drugs. In connection with the subsequent treatment of teeth, after removing the pulp tissue, I stated that in those cases where it was not advisable to fill the canals immediately on removal of the pulp an anodyne treatment was indicated. Extreme care must be taken to select drugs which have a soothing and not an irritating effect. There are some instances where we desire to irritate and thereby stimulate the peridental membrane, but here is one place where this should be avoided. Judgment must be exercised in sealing anodynes, such as oil of cloves, carbolic acid, etc., in the canals, especially in bicuspid and molar teeth, for should the filling be left too full and the agent forced through the apex by the closing of the jaws, even these agents will cease to be anodynes and become irritating. Whether oil of cloves, carbolic acid and similar agents are anodynes or irritants depends largely on where and how they are used.

In discussing the treatment of pericementitis I shall not enter deeply into the pathology of this condition. It is necessary for us to remember, however, that this membrane is very vascular and well supplied with nerves, and that it is enclosed within bony walls. Therefore, when inflammation exists in this tissue the membrane becomes thickened, forcing the tooth from its socket. This elongation of the affected tooth is one of the chief symptoms of true pericementitis, and always aids in making a correct diagnosis.

The first step in the treatment of peridental inflammation is to ascertain the cause and remove or correct it if possible. Any remedy may be used that will give immediate relief. This is what the patient most desires, but too often it appears that this is what the dentist fails to give. In our text-books on dental medicine both local and general remedies are recommended. The latter are valuable in those cases where the patient is nervous and has lost considerable sleep, but for immediate relief we must depend largely upon the local application of drugs and remedies. In those cases following the use of arsenic or cocain for the removal of the pulp tissue, and where the canals have not been filled, the pain can be relieved almost instantly by the following method: Adjust the rubber dam, placing the clamp on the tooth posterior to the one affected. Sterilize the crown and remove the dressing. Dry with alcohol. Now wrap cotton loosely around a smooth, sterile broach, dip in

oil of cloves, and carefully work into the canal or canals. Remove the broach, leaving the cotton. With a chip blower or a root-canal drier apply heat until the cotton becomes dry. Repeat this process several times. By this means we get the benefit of the heat, and better than this the eugenol—the constituent of cloves—is driven through the tooth structure, producing a profound anodyne effect upon the sensitive membrane. I have succeeded in giving immediate relief by this method when all others have failed. Grinding the tooth, where it can be done without injury, is advisable, a counter-irritant can then be applied to the gum, and the patient dismissed until the following day. It is scarcely necessary to instruct the patient to favor the tooth.

There seems to be a great deal of pericementitis produced by filling root canals. In performing this operation we should be absolutely certain that the canal is *aseptic.* If there be any doubt the filling of the root should be deferred. In a previous article I called attention to the care to be taken in filling all large canals, that the filling material may not be forced through the apex of the root, and especially should we be careful in filling the canals of teeth after having treated a fistulous or blind abscess. In these cases we must not expect the patient to flinch in filling the root, for there is no live tissue at the immediate end. The apex has been enlarged and it is very easy to force the filling material through into the space where the tissue has been destroyed. When granulation fills this space and the newly-formed tissue comes in contact with the foreign material the result will be a "lame tooth," which means peridental trouble.

In filling root canals many dentists—myself among the number—moisten the canals with eucalyptol before introducing chloropercha and the gutta-percha cone. Care must be taken here to use *eucalyptol* and not oil of eucalyptus, unless it be the refined oil. The eucalyptus tree produces a volatile oil which consists of three oils, which distil over at different temperatures; the first product is eucalyptol—hence the most volatile constituent of oil of eucalyptus and the one which is the solvent for gutta-percha. While eucalyptol is a slight irritant, it is not nearly so irritating as oil of eucalyptus. I have been modifying the irritating property of eucalyptol and increasing its antiseptic value by adding menthol and

thymol in the following proportions, which mixture is equally as good a solvent for gutta-percha as is eucalyptol alone:

℞ Menthol gr. iij
Thymol gr. ij
Eucalyptol f ʒ j
M. Sig.—As directed.

In those cases following the filling of the root, having every reason to believe that the canals are aseptic, one of the last things I should do would be to attempt to remove the root filling, as usually this only irritates. These cases can best be treated by counter-irritation and general remedies. By counter-irritation is meant the application of an irritant to some part of the body for the purpose of influencing favorably some other part which is diseased. This irritant is usually applied to the gum over the affected tooth. Capsicum plasters, black mustard papers, cartharidal collodion, all of which are officinal, are valuable, or the following mixtures, which are universally used, give much relief:

℞ Tincturæ aconiti f ʒ j
Menthol gr. xx
Chloroformi f ʒ j
M. Sig.—Apply freely to the gum about the affected tooth for several minutes.

℞ Extr. aconiti fl.
Extr. belladonnæ fl.
Extr. opii liquidi aa f ʒ j
M. Sig.—Apply to the gum as above.

℞ Tincturæ aconiti.
Tincturæ iodi.
Chloroformi aa f ʒ j.
M. Sig.—Apply as above.

As a remedy to be applied by the patient at home, a split raisin, soaked in hot water, and on which is dusted red pepper, can be held on the gum over the affected tooth. A very efficient remedy is to direct water with some force on the part. Beginning with warm water, increase the heat gradually until it is nearly boiling. This must be kept up until we get the full benefit of the heat and resolution is promoted. Another good remedy to have the patient employ is the hot foot bath. The value of this, like the application of hot water to the gums, depends largely upon the manner in which it is

done. A deep foot-bath tub should be used and the temperature of the water gradually increased until as hot as can be borne. This should be continued from twenty to thirty minutes.—*Review.*

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OVERHEARD IN A DENTAL OFFICE. By Herbert H. Kreutzmann. Lady patient has just taken seat in dental chair.

Now, Doc, you won't hurt me, will you? It's this tooth right here with the batting in it (pulling back her cheek and covering about three teeth with her finger). It's been bothering me awful, and I just made up my mind I'd have it out. I do hate to see people who haven't got nerve enough to have a tooth pulled, but go around with a big, swollen cheek, in pain all the time. Now, I'm always a little nervous when I first get into the chair, but when I once make up my mind, I believe I could have them all pulled without taking a thing. Do you freeze the gums? I heard you did. Yes, you'd better, because maybe it won't hurt quite so much then. Of course I'm not afraid, but I don't believe in standing any pain if you can get along without it. Oh, my, no! I wouldn't take any brandy. Of course, I know it's medicine in a case like this, but I just know it would make me tipsy.

Dear! that hurts as much as having it pulled, doesn't it? Are you going to pull it now? Yes, I'm ready, I guess. (Settles back in chair, trembles and shudders.) Oh, let's wait a minute. Will you open that window, please; don't you think it's warm in here? I know it will, but if the effect wears off we can inject again, can't we? I'm acting like a baby, but I never like to go at a thing until I'm all ready.

Did you make that plate for Mrs. Boideman? My; I think that's just lovely; and I've a notion to have you pull all mine to-day. I would if I was sure you'd make me one like hers. Oh, are you going to inject again? I believe I can stand it without, don't you? I know it will hurt a little more, but I don't care.

Yes; I'll open my mouth wide now, and then you be sure and get it the first time, won't you? (Settles back in chair and opens mouth, but just as dentist is about to put in forceps—) Be careful and don't tear my gum, won't you? Last time I had a tooth pulled the dentist tore my gum awful. Guess he couldn't really help it, though, because the tooth was decayed, oh, awful far down! (Again settles down in chair and opens mouth. Dentist starts with forceps

again, but she pulls his hand back, shudders a little and—) Maybe you had better put in another injection, Doctor. (Dentist goes back to boil the syringe again and she busies herself fingering his instruments.) Do you think this tooth over here (again pointing to three or four on other side) can be saved? I've only got a few left and so I want to save them if I can. Crown it? Oh, my, no, that's too expensive. Of course they look nice, but—yes; you'd better inject now. Oh, my! (Dentist wipes away the medicine and she, even while his fingers are in her mouth—) Tha' mecine taze jus awfa, dozen it? (Dentist gently pulls her head back and asks her to open her mouth wide. It won't take but a minute.) I don't see why I should be so fidgety. I never was before, but some way this seems so much worse. It is bad, isn't it?

Well (resigned), all right. (She settles back, opens her mouth, and the dentist is quick to get a good hold. A long-drawn-out groan into owa, wow, at the same time throwing one arm up around the dentist's neck, while the finger-nails on the other hand are buried deep into his wrist. Is doing her best to push herself up back over the chair, too. Then, with a final wow when it come out, she leans over to spit, meantime fixing her hair with one hand and jabbing a finger of the other into her mouth to feel the socket. Then she laughs. It takes her twenty minutes to suck out and spit all the blood she wants to, and)— My! I'm so thankful that's out, and some day I'm coming down to have them all drawn.

(Steps over in front of mirror, pulls cheek back, and looks into her mouth.) How much is that, Doctor? My; you earn your money easy, don't you? But, then, it's worth that to me, because it ached so I couldn't sleep one bit during the last two nights. (Has been fixing her hair and putting on her hat during all this.)

Well, good-by, and I'll tell everybody how careful you are. Oh, my! I nearly forgot to take the tooth, didn't I? I want to show it tc George. He always shows me his, when he has any pulled, and brags so about it—thank you (as the dentist hands her the tooth wrapped up)—that I'm just going to show him this. It's just as large as any he has shown me. Well, good-by—no, I won't catch cold in it. I'm always careful about anything like that. Good-by. I will. Thank you. Good-by.

The dentist is fifty cents richer.—*American.*

# The Dental Digest.

PUBLISHED THE LAST WEEK OF EVERY MONTH

At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

## Editorial.

### THE STATUS OF THE DENTAL PROFESSION.

Dr. Frank W. Sage of Cincinnati, well known to our readers, has the following comment to make on the editorial in our August issue, entitled "Is There a Social Prejudice Against Dentists?"

"I was much interested in your August editorial relating the instance of a New York dentist of character, education, wealth, and other qualities supposed to recommend a man as a gentleman, who was repulsed when he made application for membership in one of the fashionable clubs of that city. You state that the sole ground of his rejection was the fact that he was a dentist, and you quote the words of a member who disavows any snobbish feeling in the matter, to the effect that he would not care to fraternize with a dentist, even though he recognizes the claims of dentistry to respectability as a profession.

"This recalls an occurrence in a swell London club years ago. An American dentist practicing in that city was invited to an important function, but on his arrival was subjected to the humiliation of being utterly ignored by the members, some of whom had been his patients. When the Prince of Wales came in later he greeted the dentist with the same cordiality that he extended to the others, whereupon the members swarmed around the dentist, anxious to make amends for their error!

"Your editorial conclusion as regards the treatment of the New York dentist is that the widely prevailing ignorance in the dental profession is responsible for the prejudice which involved this individual dentist in humiliation. Which is no doubt mainly true.

"The incident as related is not really either important or significant in the highest degree. If reports are to be credited hundreds of New Yorkers neither better nor worse than this dentist have suffered

the humiliation of rejection on applying for membership in certain of the exclusive clubs. Within a month a lady related to the writer of this article, with visible pride, that a gentleman who some time ago removed from Cincinnati to New York, a man of newly-acquired wealth, had been admitted to one of the swellest clubs, into which many wealthy New Yorkers had vainly tried to effect entrance. This man, formerly the sub-editor of a Cincinnati daily paper, is a college graduate who went into the iron business and made a large fortune.

"It would be difficult to define with any exactness the requisites for membership in New York's upper sets, not to mention the most exclusive clubs. An item has gone the rounds lately (*Cincinnati Enquirer's* extract from the *London Times*) to the effect that an allowance of $50,000 annually for dress alone would hardly suffice to admit a lady to the exclusive set of New York City. What great wonder is it then that a dentist of wealth, as stated in this editorial, should fail of admission into one of the New York swell clubs? In a dozen or a score of cities not as important numerically as New York, this dentist might have been more favorably received. It is no exceptional thing for dentists in our large cities and towns to be received as members by the exclusive clubs, and to move and have an active share in the affairs of the best society. New York is not the entire country, any more than Wall street is the financial entirety of the United States.

"This clubman—who earnestly assures us he is not a snob—affirms that the doors of society swing wide open to admit the physician or the surgeon, yet are slammed in the face of the dentist. The truthfulness of this statement may well be challenged. New York city has social restrictions peculiar to itself, yet we doubt whether it be true that a dentist of education and intelligence would meet with any more insurmountable difficulty in entering any social circle than a physician or a surgeon of equal qualifications would encounter. This is purely an assumption on the part of this gentleman who is not a snob. Theoretically there would be a certain order of discrimination when it comes to a comparison of the respective services of the physician, the lawyer, and the dentist. The issues of life and death are seldom or never committed to the dentist's hands, as to the physician's. Theoretically the two professions are immeasurably separated as to importance. People could do without teeth, if it

came to an extreme test; they could get along without artificial substitutes for teeth. As compared with the loss of sight, of hearing, of life itself, or even of a limb, the loss of the teeth is insignificant. Dollars to save a tooth—a fortune to save an eye or a limb. So the lawyer's service to his client is often incomparably more important than the dentist's to his patient. The issues with which he has to deal are often a thousandfold more consequential to his client than are the most important services of the dentist to that same individual or any other.

"Judged by such standards as these, the dentist might question whether the time is ever to come, when he may expect to rank in importance as a professional man with the doctor or the lawyer, yet practically he may, for the reason that the generality of patients are satisfied with realizing the value of the particular service, without instituting such comparisons as the foregoing. It is not a habit of the human mind to disparage any service which ministers to the relief of pain or to the restoration of a lost function. It is not at all a spontaneous impulse which would lead one lately relieved of pain by his dentist to reason, 'This is all very well, but not to be compared with what Dr. Blank did when he cured me of pneumonia.'

"Granting, however, that the argument is inadequate, why need dentists feel disturbed if ultimately they should find their profession somewhat overshadowed by the older professions? What if we dentists should in the end be compelled to admit that the efforts of to-day to elevate the profession, efforts expended in the direction of reaching out after more intimate knowledge of the allied science of medicine, have served only to emphasize the essentially mechanical nature of dentistry proper? Supposing it should be proved that dentistry cannot successfully be grafted upon the parent stem of medicine; that it should be determined finally that dentistry in order to best subserve the interests of its patrons must be content to rank as a semi-profession, essentially mechanical in its most important functions—what then? Nothing of any great consequence. Men who naturally inclined to dentistry would still continue to enter the practice. Dentistry, whether we call it a profession or a semi-profession, is destined to survive. It is destined to improve, in all essential respects. It will maintain its true level in spite of all that may be done either to elevate it or to belittle it.

"After all has been said, it is altogether a question of individual

development when it comes to the inquiry, What shall be the final attainment of the dentist? Ignorance of a description is widespread among dentists. Is it not equally true of the sister professions, medicine and the law? More and more every day are professional men coming to be rated and esteemed for what they are as individuals. If it occasionally happens that a dentist is excluded from a fashionable New York club, what more inexplicable thing is it than that merchants whom we might deem qualified are rejected by the same club or others like it?

"Dentistry lacks the occult features of medicine and the law. Our patients for the most part know what we are doing when we operate for them, make a plate or a bridge. The profession is essentially mechanical in its most commonly required offices. As a profession *sui generis* its essential development must proceed along lines which consider first of all, prophylaxis; then the painless performance of operations; then the durability of operations, and the perfection of its art features. The question of its respectability will take care of itself."

We not only cannot accord with much of the foregoing, but we must take exception to many of the statements and to the spirit which pervades Dr. Sage's remarks. Furthermore, it seems to us that he has lost the point of the editorial to which he refers. He states that dentistry will survive, no matter to what level it falls or by what term it is designated. This is not the question at issue. So long as our present habits of civilization obtain human teeth will need the services of the dentist. The question is, will that dentist be a member of a learned profession or a mere artisan? Dr. Sage does not seem to think it matters, but we doubt if his belief will be shared by the majority of the profession. He says, "Ignorance of a description is widespread among dentists. Is it not equally true of the sister professions, medicine and the law?" Even granting that this were so, is ignorance in other professions any excuse for ignorance in this? As a matter of fact, however, it is not true. It is folly to blind our eyes to the facts. Even the most ardent champions of the dental profession will not argue that the average lawyer or physician is not a better educated, better read man than the average dentist. As we have said before, to say nothing of the preliminary requirements, the practice of medicine and of law, the latter especially, requires much more reading and studying than does the

practice of dentistry, so of necessity the lawyer and physician are apt to be broader men than the dentist. This being the case, the members of this profession, which certainly deserves to rank with the other two mentioned, should do all in their power collectively and individually to make dentistry a learned profession and not a semi-profession or a trade. It should always be borne in mind that the culture, character and attainments of the individual determine the status of the profession in the eyes of the community.

## Notices.

### BAYONNE (N. J.) DENTAL SOCIETY.

The Bayonne (N. J.) Dental Society was organized Aug. 26, 1904, and the following officers were elected: Chairman, V. E. Mitchell; Secretary, W. H. Mitchell.

### HUNTSVILLE (ALA.) DENTAL SOCIETY.

The Huntsville, Ala., Dental Society was organized Sept. 15, 1904, and the following officers were elected: President, W. D. Allen; Vice-president, I. B. Wyatt; Secretary and Treasurer, F. L. Adams.

### NORTHERN ILLINOIS DENTAL SOCIETY.

The Northern Illinois Dental Society will hold its seventeenth annual meeting at Sterling, Oct. 12-13, 1904. Take due notice and govern yourselves accordingly. A. M. HARRISON, Secy., Rockford.

### OHIO STATE BOARD OF DENTAL EXAMINERS.

The regular semi-annual meeting of the Ohio State Board of Dental Examiners will be held in Columbus, Nov. 29, 30 and Dec. 1, 1904, at the Hartman Hotel. Applications for examination should be filed with the Secretary by Nov. 19. For further information address

H. C. BROWN, Secy., 185 E. State St., Columbus.

### THIRD AND FOURTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

The joint meeting of the Third and Fourth District Dental Societies of the State of New York will be held at the New Van Renssalaer, Troy, Oct. 18, 1904. Dr. E. H. Angle of St. Louis will give an illustrated lecture, "Some Things That Should Be Better Known by Both Teachers and Practitioners of Orthodontia." The Committee is arranging an attractive program of essays and clinics, and a cordial invitation is extended to the profession to be present. CHAS. E. ALLEN, Secy., 391 Hamilton St., Albany.

## NORTHWESTERN MICHIGAN DENTAL ASSOCIATION.

The Northwestern Michigan Dental Association was organized at Traverse City, Sept. 6, 1904, and the following officers were elected: President, C. C. Bowen, Cadillac; Vice-president, P. H. Penhallegon, Traverse City; Secretary, C. A. Burridge, Traverse City; Treasurer, Frank Graham, Harbor Springs.

## CANADIAN DENTAL ASSOCIATION.

The Canadian Dental Association met at Toronto, Sept. 6-8, 1904, and elected the following officers: President, Eudore Dubeau, Montreal; Vice-president, S. W. McInnis, Brandon; Secretary, C. T. Morrison, Montreal; Treasurer, W. G. Spaulding, Toronto; Registrar, D. K. Thomson, Halifax; Executive Committee, Drs. Brown, Nolin and Oliver, Montreal.

## NORTHEASTERN DENTAL ASSOCIATION.

The tenth annual meeting of this Association will be held in Unity Hall, 68 Pratt St., Hartford, Conn., October 19-21, 1904, beginning October 19, at 11 o'clock A. M. Papers are promised from Dr. John I. Hart of New York, Dr. F. S. Fossume of New York, Dr. T. C. Stellwagen, Jr., of Philadelphia, and others. A large number of good clinics are promised, and the exhibits will also be a feature of the meeting. Please remember the dates and make an effort to attend. The usual reduction in railroad rates is expected.

EDGAR O. KINSMAN, Secretary, Cambridge, Mass.

## ARKANSAS STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Arkansas State Board of Dental Examiners will be held December 2 and 3, 1904, in Little Rock, for the examination of all applicants. Those having applied for examination will report to the Secretary Friday morning, Dec. 2, with rubber dam, gold, plastic filling material and instruments, to demonstrate their skill in operative dentistry. All who wish may bring their patients. As far as possible patients will be furnished. The Board reserves the right to select the cavity to be filled. The examination will cover all branches of the dental art. No temporary certificate will be issued. Examination fee, $5.00. For further information write the Secretary.

A. T. MCMILLEN, Sec'y, Little Rock, Ark.

## NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

At the annual meeting of this organization, held in St. Louis, Aug. 25-27, 1904, the following officers were elected: Pres., Thomas J. Barrett, Worcester, Mass.; Vice-Pres. of West, Frank E. Moody, Minneapolis; Vice-Pres. of South, F. A. Shotwell, Rogersville, Tenn.; Vice-Pres. of East, C. Stanley Smith, Cincinnati; Secretary and Treasurer, Charles A. Meeker, Newark, N. J. Committee on Colleges.—Charles C. Chittenden, Madison, Wis.; J. A. Hall, Collinsville, Ala.; James G. Reid, Chicago. Conference

Committee.—John F. Dowsley, Boston; Charles S. Stockton, Newark, N. J.; H. W. Campbell, Suffolk, Va.

CHAS. A. MEEKER, Sec'y, 29 Fulton St., Newark.

## NORTHERN INDIANA DENTAL SOCIETY.

The sixteenth annual meeting of the Northern Indiana Dental Society will be held Oct. 18th and 19th at Huntington. It is expected that we will have the largest attendance of any meeting ever held in this section of the country, and you cannot afford to miss hearing such essayists as Drs. G. V. Black, Hart J. Goslee, F. E. Roach, George E. Hunt, Wm. T. Reeves, E. X. Jones, J. Q. Byram, G. E. Johnson, F. R. Henshaw, F. M. Bozer, Lavinia B. McCollum, C. A Keehn, and many others who have consented to appear on the program, besides a very attractive list of clinics, demonstrating all of the newest and most valuable things in practice.

All the leading manufacturers have signified their intention of making an exhibit of their products.

Every up-to-date dentist will be there. Are YOU coming?

Special social features for Tuesday evening.

Remember the date. OTTO U. KING, Sec'y, Huntington.

## ILLINOIS STATE BOARD OF DENTAL EXAMINERS.

The regular annual meeting of the Illinois State Board of Dental Examiners, to examine applicants for license to practice dentistry in this state, will be held in Chicago, October 13-15, 1904. Under an opinion of the Attorney-General the following are eligible to take the examination before the Board: "Anyone holding a medical diploma from a reputable medical college; anyone who has been a legal practitioner of dentistry for ten years prior to moving into the state, and anyone who failed to register in this state at the time the law went into effect, which was in 1881." Candidates must furnish their own patients, and come provided with the necessary instruments, rubber dam and gold to perform practical operations and such other work as is deemed advisable by the Board. Those desiring to take the examination should matriculate with the secretary at least ten days before the date of meeting. The examination fee is $10.00. Any further information can be obtained by addressing the Secretary. J. G. REID, Sec'y, 1204 Trude Bldg., Chicago.

## RESOLUTIONS ON DEATH OF DR. M. D. NISBET.

At a special meeting of the Sioux City Dental Association, held on August 16, 1904, the following resolutions were adopted:

WHEREAS, The natural course of events has removed from this life Dr. Marshall D. Nisbet, who passed to the Great Beyond August 13, 1904, and,

WHEREAS, The dental profession recognizes the benefits received through his having lived, and by his life given us an example of a true and courteous professional gentleman, therefore be it

*Resolved,* That in the death of Dr. Nisbet our profession has lost a man of sterling worth, whose progress in the profession was a source of pride to his colleagues, and from whose example all hope to profit; also

*Resolved,* That we condole with his bereaved family, and that a copy of these resolutions be sent to his widow, the dental journals, the Sioux City daily papers, and also be inscribed on our official records.

ARTHUR SOLVSBERG,
A. S. WASSON,
T. A. ROSE,
} Committee.

## NATIONAL DENTAL ASSOCIATION.

The annual meeting of the National Dental Association was held at St. Louis, Mo., in August, 1904, and the following officers were elected: President, W. E. Boardman, Boston, Mass.; Vice-president from the East, J. I. Hart, New York, N. Y.; Vice-president from the South, R. K. Luckie, Holly Springs, Miss.; Vice-president from the West, Wm. Conrad, St. Louis, Mo.; Corresponding Secretary, C. S. Butler, Buffalo, N. Y.; Recording Secretary, A. H. Peck, Chicago, Ill.; Treasurer, V. E. Turner, Raleigh, N. C.

*Executive Committee.*—J. D. Patterson, Chairman, Keith and Perry Building, Kansas City, Mo.

*First Division Committee on Arrangements.*—J. D. Patterson (*1905), Keith & Perry Building, Kansas City, Mo.; C. N. Johnson (*1906), Marshall Field Building, Chicago, Ill.; H. A. Smith (*1905), 116 Garfield Place, Cincinnati, O. *Second Division—Committee on Credentials and Auditing.*—V. H. Jackson (*1906), 240 Lenox Ave., New York, N. Y.; T. S. Waters (*1905), 756 Eutaw St., Baltimore, Md.; W. N. Cogan (*1907), 1746 M St., N. W., Washington, D. C. *Third Division—Committee on Voluntary Essays.*—C. S. Butler (*1907), 680 Main St., Buffalo, N. Y.; G. V. I. Brown (*1907), Empire Building, Milwaukee, Wis.; T. P. Hinman (*1906), 22½ S. Broad St., Atlanta, Ga. (*Term expires.) *Executive Council.*—H. J. Burkhart, Chairman, Batavia, N. Y.; B. Holly Smith, 1017 Madison Ave., Baltimore, Md.; J. Y. Crawford, Jackson Building, Nashville, Tenn.; M. F. Finley, 1928 I St., N. W., Washington, D. C.; Chas. McManus, 80 Pratt St., Hartford, Conn. (W. E. Boardman, A. H. Peck, ex-officio members.)

# News Summary.

J. P. BOWMAN, a dentist at Philadelphia, died Sept. 1, 1904.

E. W. BOWE, a dentist at Providence, R. I., died Sept. 1, 1904.

W. S. WOOD, 24 years old, a dentist at Troy, N. Y., died Sept. 23, 1904.

D. F. LEACH, 62 years old, a dentist at Shelton, Conn., died Aug. 25, 1904.

J. S. MCLEAN, a dentist of Edmonton, Man., was drowned Aug. 22, 1904.

E. W. EMERSON, a dentist of Los Angeles, committed suicide Sept. 5, 1904.

J. E. STAMBAUGH, 66 years old, a dentist of Woodsboro, Md., died Sept. 4, 1904.

J. K. FLOYED, 26 years old, a dentist at Albany, Ga., was drowned Sept. 21, 1904.

R. F. STRINGER, a dentist at Rogers, Ark., died Sept. 12, 1904, from a stroke of paralysis.

C. T. WRIGHT, 61 years old, a dentist at Arlington, Ky., died Sept. 11, 1904, from paralysis.

LOUIS W. BUSH, 75 years old, a dentist of San Francisco, died Aug. 20, 1904, of heart failure.

BERT MILLER, 26 years old, a dentist at Lorimer, Ia., was stricken with paralysis, Sept. 2, 1904.

C. J. SOWLE, a dentist at Rockford, Ill., has been very sick with typhoid fever, but is recovering.

A. F. PRESTON, 93 years old, a dentist in Boston, died Sept. 8, 1904, from injuries following a fall.

F. F. TEBBETS, 64 years old, a dentist at Sacramento, died Sept. 5, 1904, from ptomaine poisoning.

C. ARMSTRONG, 30 years old, a dentist at Kirkwood, Ill., died Aug. 25, 1904, from a stroke of paralysis.

F. HASBROUCK, 70 years old, a dentist of New York, died Aug. 7, 1904, from cancer of the stomach.

GEORGE H. CHANCE, 74 years old, a dentist at Portland, Ore., died Sept. 10, 1904, from internal cancer.

VIOLA SWIFT, the first woman in Cincinnati to practice dentistry, died Sept. 15, 1904, after a long illness.

ALBERT RIEBLING, 43 years old, a dentist of New York, poisoned his mistress and committed suicide Sept. 24, 1904.

J. W. RHODENBAUGH, 32 years old, a dentist of Allegheny, Pa., died suddenly Aug. 17, 1904, from neuralgia of the heart.

S. G. MAYO, 28 years old, formerly practicing dentistry at Paterson and Newark, N. J., died Aug. 30, 1904, in Denver, of tuberculosis.

C. P. ARTMAN, for many years in the practice of dentistry at Waterloo, Ia., died Aug. 28, 1904, after suffering some time with paralysis.

WIRE CUTTER.—Grind a notch in plate shears near the joint and thus make a good wire cutter.—Drs. Stansbury and Alexander in *Hints*.

LEMON JUICE AS A DENTIFRICE.—The Philipsburg, Pa., *Journal* is responsible for the following: "If you want to have teeth like polished ivory, take a piece of chamois skin, dip it in lemon juice, and rub the teeth until they are hot to the touch."

CLEANLY.—Teacher—"Who can tell me why the Puritans came to this country?" Small member of history class—"I can." "Well?" "To purify their blood."—*Cincinnati Tribune.*

WORCESTER TO HAVE DENTAL INFIRMARY.—The Worcester, Mass., City Hospital is to have a dental department, where extractions and simple operations can be performed for poor people free of charge.

MOULDING SAND.—I use oiled sand because it is always ready for use and avoids the delay of moistening the sand whenever a die is to be made. I prefer lard oil, as the sand then does not cake and no sifting is needed.—L. P. Haskell, *Items.*

NEVER USE $H_2O_2$ IN CLOSED CAVITIES.—Never introduce hydrogen dioxid into a cavity in which pressure would be likely to do damage, unless the opening leading into it is sufficiently large to allow for an immediate escape of the gas formed.—*Intern. Jour. of Surg.*

BANKRUPT.—A. E. Black, a dentist of New York City, filed a petition in bankruptcy Sept. 14, giving his liabilities as $2,770 and his assets as $50.—J. H. Maloney, a dentist at Red Oak, Ia., filed a petition in bankruptcy Aug. 18, giving his assets as $689 and his liabilities as $3,629.

IMMEDIATE REPAIR OF GUM SECTION.—The pins in the old section were broken off. With diamond drill cut retention cavities where pins were. Having secured platinum pins from other plate teeth, reset them in the gum section, using amalgam for filling material, then vulcanize.—*Forum.*

GAUZE DRAINS CONTRAINDICATED IN PUS CAVITIES.—Never forget the fact that gauze will drain serum or very fluid discharges, but not pus. Hence the filling up of an abscess cavity with gauze is the surest possible way of blocking-in the secretion and favoring sepsis.—*Intern. Jour. of Surg.*

FATALITIES.—Sept. 6 a man in Bridgeport, Conn., died from hemorrhage following the extraction of a tooth. Physicians did all they could for him, but the flow of blood could not be stopped.—Sept. 21 a young woman at Ottawa, Can., died under nitrous oxid given prior to the extraction of a tooth.

FIRES.—Taylor & Stalnaker, Logansport, Ind., Aug. 21, nominal loss.—Chandler & Thometz, Calumet, Mich., Aug. 9, $300 loss, partly insured.—M. Carman, New York, Sept. 22, loss $1,000, fully insured.—L. C. Davenport, Fargo N. D., Aug. 13, $200 loss.—J. D. McCoy, Palmer, Tex., Aug. 30, loss $450, insurance $225.

BLUE LIGHT NEW ANESTHETIC.—According to newspaper report, two professors of Geneva, Switzerland, have discovered a new anesthetic "which promises to revolutionize the practice of dentistry." It is stated that a tooth can be extracted painlessly after the patient has been subjected to blue light three minutes, and that the anesthetic acts without causing him to lose his senses.

EXTRACTING FRONT TEETH.—To extract any of the six anterior teeth, take a pair of right-angle forceps and rotate the tooth in its socket and it will slip out without any further effort. This method once acquired will always be kept up, as I have never known any one to fall back to the old plan after once having tried this.—Dr. C. A. Reeves, *Hints.*

DON'T NEED PAINLESS DENTISTRY.—Oregon dentists think they have discovered one cause for the placidity and passivity of the Chinaman. They say he has no nerves in his teeth and that it is a waste of energy to try "painless dentistry" on him. If this is true, may not the Anglo-Saxon have to admit the Chinese claim of race superiority?—*Exchange.*

PARTIAL PLATE—CLOSE BITE.—In making a partial rubber plate, when the bite is close, solder a flange of platinoid under the heads of the platinum pins, perforate it with holes, and let it extend in the body of the plate. If carefully heated "rubber teeth" will not crack when soldered with fine gold solder, and the platinoid will not melt under 20-carat solder.—*Hints.*

UNFORTUNATE.—"Haf you heard about Isaacstein?"

"Vas it iss?"

"Dey took him by the hospital und made his appendix avay from him, alretty."

"Ha! Vat a pity ain't it he didn't haf it in his vife's name."—*Cornell Widow.*

BURNT.—The would-be porcelain expert had just fixed an inlay that happened, *after* cementation of course, to be several shades darker than the tooth. Both viewed the result, he directly and the lady by means of a mirror, when the doctor broke the silence with—"Well, what do you think of it?" After a more or less painful moment she slowly replied—"It looks like crust on a biscuit."—*D. O. & L.*

A SICKLY SONG.—"Sing a song of sickness, yellow in the eye,
Four-and-twenty gall stones; choledecto-my!
When the wound was opened, the bile began to flow;
When the deuce it's going to stop the doctor doesn't know!"

ZINC OXYPHOSPHATE: ITS ADVANTAGES AS A FILLING MATERIAL.—The zinc oxyphosphate cement, as far as adaptation to cavity walls is concerned, is by far the best of any filling materials used by the dentist, and if it were indestructible in the oral fluids and impervious to them it would be the ideal, and the dental profession would need to look no farther for perfection.—H. B. TILESTON, *Summary.*

BILES.—"Three blind boils!
See how they run!
They all ran, after the farmer's wife
Had cut off their heads with a septic knife;
You never saw such a mess in your life
As three blind boils."—*Jour. of Surg.*

TREATMENT OF A ROOT THROUGH A JACKET CROWN.—The jacket crown being hollow and having a metal back, provides a ready means of access to the pulp-canal; this is a point in its favor, particularly to those who claim that a crown capped will surely give trouble unless the pulp be devitalized. Using a crown of this description, therefore, will demonstrate pulp vitality, and when treatment is necessary lessen its difficulties.—W. A. CAPON, *Brief.*

DUNHAM'S NORMAL HISTOLOGY.—A Text-book on Normal Histology for the use of Students and Practitioners of Medicine. By Edward K. Dunham, Ph.B., M.D., Professor of General Pathology, Bacteriology and Hygiene in the University and Bellevue Hospital Medical College, New York. New (3d) edition, revised and enlarged. In one octavo volume of 334 pages, with 260 illustrations. Cloth, $2.75, net. Lea Brothers & Co., Philadelphia and New York, 1904.

WOMAN SWINDLES PHILADELPHIA DENTISTS.—A pretty young woman, with a pleasing address and plenty of nerve, has been "working" dentists in the northeastern section of Philadelphia. Under the plea that she wished to retain their professional services for a guild of nurses the young woman induced many of the dentists to give her fifty cents each to cover the cost of having their names printed in the guild journal. Look out for a plump, pretty woman, about five feet one inch in height.

DIVORCES.—Edgar Binford, a dentist at Rock Island, Ill., was sued for divorce on Sept. 7 by his wife, who alleges desertion and non-support.—T. S. Higgins, a dentist at Portland, Ore., was sued for divorce by his wife on Sept. 10, who charges him with unfaithfulness.—E. L. Moore, a dentist at Bay City, Mich., was sued Aug. 27 for divorce by his wife, who charges non-support.—H. A. Whiteside, a dentist in New York City, was sued for divorce by his wife Aug. 31, who charges unfaithfulness.

ESSIG & KOENIG'S DENTAL METALLURGY.—A Manual for the use of Dental Students and Practitioners. By Charles J. Essig, M. D., D.D.S., formerly Professor of Mechanical Dentistry and Metallurgy in the Dental Department of the University of Pennsylvania, and Augustus Koenig, B.S., M.D., Demonstrator of Metallurgy in the Dental Department of the University of Pennsylvania, etc. New (5th) edition, revised and enlarged. In one 12mo volume of 318 pages, with 76 engravings. Cloth, $2.00, net. Lea Brothers & Co., Philadelphia and New York, 1904.

DIPHTHERIA ANTITOXIN IN THE TREATMENT OF APHTHOUS STOMATITIS.—Influenced by several suggestive experiences of Sangiovanni, Gaspardi and Santi, Del Manaco was induced to use diphtheria antitoxin in the treatment of an infant one year old affected with a grave aphthous stomatitis which had produced a marked cachexia. The injection was promptly followed by a sensible amelioration in the general state, while at the same time the sublingual swelling, which had been unaffected by lotions of potassium permaganate and silver nitrate, rapidly disappeared.

THERAPEUTIC VALUE OF RADIANT HEAT.—Radiant heat from a red-hot coal fire, notwithstanding asseverations to the contrary, is effective in sub-

duing the almost unbearable irritation of chilblains. The irritation is at its worst during about two hours in the twenty-four, and can be controlled for that period by holding each foot for a minute or two just as near to the fire as can be tolerated. Steeping in very hot water approximates to this. The trouble recurs the next day, but can be abolished in the same way, and after three or four repetitions a cure is effected.—*Therapeutic Gazette.*

CAUSE OF ACTION.—Hicks—"Pulling, the dentist, has brought suit against one of his patients for damages caused by the extraction of one of the patient's teeth."

Wicks—"Guess you mean the patient has brought suit against the dentist."

Hicks—"Mean what I said. Doctor Pulling declares he was over-persuaded by his patient, and he estimates if the tooth had been left in it would have been worth at least $150 to him to keep it in working order."—*Boston Transcript.*

BRITONS THINK TOOTH BRUSHES PERILOUS.—According to newspaper report, at a meeting of the Board of Guardians near Folkstone, Eng., last month one member moved that tooth brushes should be supplied to the children's cottage homes under their care, adding that tooth brushes were as necessary as soap and water. The mayor vigorously opposed the motion, arguing that the stamina of Englishmen was being ruined by such fads, and that probably many of the guardians had not used a tooth brush the greater part of their lives. The majority of the board was of the mayor's opinion, and the children are to continue without tooth brushes.

ACCIDENTS.—Sept. 2 a dentist at Fort Wayne, Ind., was badly injured by the explosion of a vulcanizer. His nose and cheek bones were broken, and bits of his eye glasses were driven into the flesh. His skull was also slightly fractured.—Last month the fountain spittoon in the office of a dentist at Owosso, Mich., overflowed during the night and caused $300 damages to the stock of a clothing store on the floor below.—Sept. 7 a dentist's assistant at Riverhead, L. I., was badly burned while heating up some wax which caught fire.—Sept. 6 a dentist at Lancaster, Wis., was severely scalded by steam when the safety valve on his vulcanizer blew out.

EXAMINING BOARD AFFAIRS.—Aug. 30 the governor of California appointed the following dentists as members of the state board of dental examiners: F. G. Howard, Los Angeles; G. A. White, Santa Barbara; C. A. Herrick, Jacksonville.—A Cuban has brought suit against the Florida Board for a temporary license. He presented a certificate issued by the governor-general of Cuba in 1889, and the board refused to honor it.—According to newspaper report, the Oregon Board is hampered in its work by lack of funds, which condition it is alleged is responsible for the large number of illegal practitioners in the state.—At the last meeting of the Vermont Board thirteen applicants were successful in passing the examination.

STEPHEN G. STEVENS, a dentist of Boston, died suddenly of heart failure, Sept. 5. Dr. R. R. Andrews has kindly furnished the following data concerning his life: "Dr. Stevens was an honored member of the dental pro-

fession and a very skillful operator. He was born at Brooks, Me., in 1844, and commenced the practice of dentistry in Lynn, Mass., afterwards moving to Boston. He was a veteran of the Civil War and served in Company D of the New York Frontier Cavalry. He graduated from the Boston Dental College in 1877, and was a trustee of the college for many years. He had served as president of most of the societies in his city and state, and at the time of his death was a member of the Boston Society of Dental Improvement, the American Academy of Dental Science, the Northeastern Dental Society and the Alumni Association of Boston and Tufts Dental College."

APPRECIATE THE DIGEST.—I appreciate the Digest greatly. J. O. Ely, Chicago.—The Digest is all right and I watch for its coming every month. C. E. A. Ross, West Newton, Mass.—The Digest is one of the very best journals published, and I can spare the small subscription better than I can the Digest. G. W. Gray, Rutland, Ill.—I read the Digest and like it, so let it continue to come. J. A. Bond, Warren, Ark.—The Digest is strictly first-class. P. M. Sharp, Cadiz, O.—The Digest is among the best, and I do not want to miss a number. W. R. Johnston, Montague, Mich.—Please send me the February number of the Digest, as I have lost it. I wish to keep them all, for the Digest is too valuable not to have the volumes bound as they are completed. T. L. Hale, Watertown, Tenn.—Probably every time I get the value of the year's subscription from a single number of the Digest. D. B. McLain, Chicago.

PULP-CAPPING.—Long ago experience established the fact that the operation, that it may promise success, must fulfill three conditions: First, the material employed must be non-irritating; second, it must not produce pressure upon the organ, for pressure will set up disturbances that will almost surely result in devitalization; third, the covering must be in absolute contact with the organ, for if space exists the pulp will protrude through the opening, and strangulation and death of the organ will result. Where these conditions are met successes will be many and failures few in cases such as are now in mind, namely, newly exposed pulps, where no pathological conditions have existed. To cap a pulp that has for some time been exposed, and where moribific influences have already begun their work, is simply to court failure, and should not be attempted.—S. H. GUILFORD, *Stomatologist.*

A PRIVILEGED PATIENT.—Dr. Wyman, surgeon-general of the public health and marine hospital service, tells (*Harper's Weekly*) an amusing story in which there figures, as the patient, Lord Charles Beresford of the British navy, and as the physician in attendance, Sir Frederick Treves of the royal household. Sir Frederick listened attentively to the recital of Lord Charles' symptoms. Every now and then, as some particular point seemed to strike him, the physician would murmur "excellent" or "splendid," much to the discomfiture of Lord Beresford, who was at a loss to understand such enthusiasm. Finally, after some minutes' reflection, the royal physician astonished his patient by patting him on the shoulder and exclaiming: "You'll pull

through very nicely, my dear fellow, but, really, you must allow me to congratulate you. You have the rarest disease of the century. You have, you lucky dog, a disease that heretofore was thought to be extinct!"

CALIFORNIA DENTAL LAW CONSTITUTIONAL.—The Supreme Court has decided that the dental law of California is constitutional. Henceforth the board of dental examiners will have all the power it has claimed in the issuance of licenses to practice. The arguments of the unlicensed dentists that the laws were discriminatory are shown to be inapplicable. The contest was instituted by those who could not get licenses from the state board, and the matter was carried to the Supreme Court on a petition for a writ of habeas corpus in favor of a man who was arrested for practicing dentistry without a license. The court holds that while the law gives the board great power, the Legislature has the right to impose such restrictions as it may choose when the public welfare and health are involved. Dentists who were practicing prior to the passage of the act and those who are graduated from schools of recognized standing may secure licenses under the law at the will of the board.

ROBBERIES.—L. J. Andrews, Rockford, Ill., Sept. 8, $42.—I. N. Simms, Aurora, Ill., Sept. 18, $150.—Mabee Bros., Galesburg, Ill., Sept. 18, $30.—H. L. Davis, Muncie, Ind., Sept. 15, $50.—Sept. 8 a sneak thief entered a dentist's reception room at Anderson, Ind., and stole the pocketbook of a woman patient who was in the chair.—Spears Bros., Brazil, Ind., Sept. 2, four sets of forceps. The thief was arrested in Terre Haute, while pawning the instruments.—L. B. Lockwood, Nashua, Ia., Sept. 1, $100.—F. T. Waters, Orange, Mass., Sept. 5, $200.—J. D. Hagerty, Fairmont, Minn., Aug. 19, $60.—E. T. H. Ellis, a dentist of New York City, formerly of Rockford, Ill., was sent to jail Sept. 24 for stealing $200 worth of gold from a dentist who gave him work.—Daniel Murray, Brooklyn, Aug. 13, $12.—G. W. Egelston, Shortsville, N. Y., Aug. 23, $10.—M. Jacobson, New York, Aug. 20, $300.—W. B. Horton, St. Mary's, O., Aug. 28, $60.—B. F. Gilmer, Dennison, Tex., Sept. 5, $30.—Sept. 11 an eccentric thief at Richmond, Va., stole the ground-glass door from a dentist's office. Nothing else was taken—P. T. Van Ornum, Racine, Wis., Sept. 5, $200.

DAMAGE SUITS.—A dentist in Chicago has been sued by a woman for $10,000 damages for filling the wrong tooth.—A woman in Newark, N. J., lost her set of false teeth and a dentist, not her own, found them. She alleges that he not only refused to give them up, but converted them to his own uses, so she is suing him for $300 damages.—A dental salesman has sued a dentist of Philadelphia for $10,000 damages for defamation of character.—A dentist of Waukegan has been sued for $5,000 damages by a former assistant, who alleges that the dentist "beat him up."—A farmer in Wisconsin agreed to pay a dentist in Milwaukee $104 for two sets of teeth. After paying $80 he declined to contribute any more. Some weeks later he returned to the office to have one of the plates adjusted, and the dentist removed the plate from his mouth and locked it up in the safe, refusing to return it until the balance of $24 was paid. The farmer brought suit for pos-

session of the teeth, but the justice, after deliberation, decided that a dentist is not compelled to deliver a set of teeth until they are paid for, just because they have been fitted in the mouth. The farmer will probably now decide that honesty is the best policy and pay up.

ILLEGAL PRACTITIONERS.—Sept. 22 a man at Los Angeles was arrested for practicing dentistry without having obtained a license.—Aug. 18 a man was arrested at Victor, Colo., on the charge of practicing dentistry without a license. He has had some trouble with the board before for the same offense.—Sept. 21 a traveling dentist was arrested at Moline, charged with selling medicine on the streets without a state license.—Sept. 24 the proprietor of a dental parlor in St. Louis and one of his assistants were arrested for practicing dentistry without a license.—Sept. 1 a dentist's assistant in Rochester was arrested for practicing dentistry without a license. The man who made the complaint charges that he has lost the sight of one eye because of the unskillful work which the assistant did, and after the local authorities have settled the case he threatens to bring a civil suit for damages against the assistant and his employer.—Aug. 27 a dentist in New York was arrested for practicing dentistry without a license.—Sept. 10 a man at Bellefontaine, O., was fined $50 and costs for practicing dentistry without having registered with the board.—Sept. 7 a judge in the Superior Court at Seattle fined one man $200, another $200 and costs, and a third $100 and costs for practicing dentistry without a license.

MARRIAGES.—W. F. Beatty, a dentist of Crowley, La., was married to Miss Bessie Wood of Eunice, La., Aug. 25.—H. W. Davis, a dentist of Salt Lake City, Utah, was married to Mrs. Minnie Leason of Salt Lake City, July 22.—J. E. Ellison, a dentist of Logan, O., was married to Miss Edith Engle of Logan, Aug. 25.—L. L. Finch, a dentist of New York, was married to Miss Rebecca Lichtenstein of Newark, N. J., Aug. 26.—Tang Yawn Fond, a Chinese dentist of Boston, was married to Miss Alice Murrie of Dorchester, Mass., Aug. 24.—F. C. Friesell, a dentist of Pittsburg, was married to Miss Elizabeth B. Patterson of Marysville, Pa., Aug. 18.—Joseph Fulton, a dentist of Virginia, Ill., was married to Miss Mabel Wood of Cora, Mich., Aug. 25.—J. C. Grant, a dentist of Athens, Tenn., was married to Miss Nannie B. Spears of Rogersville, Tenn., Sept. 13.—S. W. Hussey, army dentist at Fort Snelling, Minn., was married to Miss Elizabeth L. Lugg of Berkeley, Cal., Sept. 15.—W. F. McKibben, a dentist of Linneus, Mo., was married to Miss Jennie Mullins of Linneus, Aug. 17.—H. C. Miller, a dentist of Grand Island, Neb., was married to Miss Florence Howell of Denver, Sept. 7.—I. H. Schoolfield, a dentist of Cincinnati, was married to Miss Laura Weiler of Cincinnati, Sept. 7.—Thomas Stone, a dentist of Albany, Ind., was married to Miss Bertha Eberling of Dunkirk, Ind., Sept. 19.—H. S. Thomson, a dentist of Springfield, Mass., was married to Miss Miriam F. Munyan of Springfield, Sept. 7.—L. E. Vanderpool, a dentist of Philadelphia, was married to Miss Mary Boyer of West Sand Lake, N. Y., Aug. 13.—Wm. A. Wainwright, a dentist of Winchester, Ill., was married to Miss Mary E. Roberts of St. Louis, Sept. 8.—Otis M. Young, a dentist of Marion, O., was married to Miss Nettie M. McCurdy of Marion, Sept. 21.

FETOR OF THE BREATH.—An offensive breath is a functional disorder liable to occur at all periods of life. Men are more subject to it than women, on account of their irregular habits and diet. It is an important and characteristic symptom of many morbid conditions found in the nose, mouth, throat, chest and stomach, and varies in intensity. In the oral cavity itself, decayed teeth, accumulations of tartar, and diseases of the gums and maxillary bones and of the mucous membrane are the most frequent causes of this offensive condition. There is a tendency among the laity to ascribe to decayed teeth all fetor emanating from the oral cavity, and while these are undoubtedly very active agents in the production of offensive odors, still the more lasting and persistent odors are due to the chronic and exudative diseases of the gums, bones and mucous membranes.—H. JEROME ALLEN, *Cosmos.*

NOSE, THROAT AND AIR-PASSAGES AND DISTURBED DIGESTION.—The disturbance of the air-passages due to faulty digestion may be brought about in three principal ways: (1) The nose and throat condition may be the expression of a general constitutional state. (2) They may result from direct irritation caused by acid eructations or vomit. (3) They may, in cases secondarily due to bacterial invasion, depend primarily on the reduced resistant power of the tissues caused by faulty or depraved nutrition. Digestive disturbances, on the other hand, may be directly due to the swallowing of unhealthy secretions from the nose and throat. They may also be due to other causes not quite clear. Clinical experience has shown that a certain number of cases of disordered digestion fail to improve until some septal deformity has been removed, or overgrown tonsils and adenoids ablated.—BEVERLY ROBINSON, *Boston Med. and Surg. Jour.*

LONG LIFE.—Weber sums up the main points to be observed by those desirous of a long life as follows: (1) Moderation in eating, drinking and physical indulgence. (2) Pure air out of the house and within. (3) The keeping of every organ of the body as far as possible in constant working order. (4) Regular exercise every day in all weathers, supplemented in many cases by breathing movements and by walking and climbing tours. (5) Going to bed early and rising early, and restricting the hours of sleep to six or seven. (6) Daily baths or ablutions, according to individual conditions, cold or warm, or warm followed by cold. (7) Regular work and mental occupation. (8) Cultivation of placidity, cheerfulness and hopefulness of mind. (9) Employment of the great power of the mind in controlling passions and nervous fear. (10) Strengthening the will in carrying out whatever is useful, and in checking the craving for stimulants, anodynes and other injurious agencies.—*N. Y. Med. Jour.*

PULP-PROTECTION IN CASES OF IRRITATION AND HYPEREMIA.—When cases present themselves with slight irritation, where no exposure has actually occurred, the cause possibly being the nervous irritability of our patients, or what is generally termed the temperative stage, we are justified in attempting to preserve the same. This is generally accomplished in ways

commonly known to all, but one to which I am particularly partial is simply this: After the cavity has been washed with warm water, thoroughly dried, and made aseptic by the use of a solution of carbolic acid, use a small disk of hard gutta-percha, sufficiently large to cover the supposed area; compress the center by the use of a round burnisher, and place therein a small portion of chlora-percha, placing the disk in position and covering with a coating of zinc oxyphosphate, forming a hardened surface upon which to work. A small platinum disk may also be used in the same manner, and especially in smaller cavities is it preferable.—J. F. WERNER, *Summary*.

ARGUMENT FOR BRIDGE TO REPLACE BICUSPIDS.—Where the bicuspids have been lost the writer has for many years made use of the split pin and tube, with the hooked spur resting in a filling in the molar. The cuspid is devitalized and the canal enlarged to the size of the tube to be used. The split pin is made and bent in the desired form, and with the tube is placed in position in the tooth, the impression and bite taken, and the bridge constructed. When it is completed a little wax is put around the pin at the entrance of the tube to prevent any cement from working into it, and the piece is cemented. When the cement has hardened the bridge is removed, the rubber dam adjusted, and after a little of the cement has been cut away from around the end of the tube a tightly-fitting polished steel mandrel is inserted and a gold filling packed tightly into the cavity around the pin and over the end of the tube, thus perfectly sealing it in, so that there is no possibility of the cement washing away. The pin is then removed and the filling finished and polished. This makes a serviceable attachment, and it has also been used many times in restoring upper central or lateral incisors which have been lost, and even when all of the incisors were gone, by using both of the cuspids.—FRED. A. PEESO, *Items*.

RADIO-ACTIVITY AND THE PRODUCTION OF HELIUM.—As a matter of fact, the most remarkable property of radium would probably have escaped observation had not helium been discovered and its properties made known. The energy manifested by radium is not due to radium at all, but to the radio-active emanation which it produces from itself, and these emanations would appear to be inert gases, perhaps argon or members of the argon group. The fact that helium was found in minerals containing uranium suggested that helium might be connected in some way with radio-activity. Eventually Sir William Ramsay and Mr. Frederic Soddy showed that though the fresh emanations from radium did not exhibit the spectrum of helium, yet as the radio-activity dies down helium is produced in small but ever-increasing quantities. Helium would thus appear to have been born, so to speak, out of the emanations. Are these emanations related closely to the primordial matter, out of which all the elements known to chemistry by process of ages have been elaborated? We are thus brought face to face with the old theory of transmutation, and a fresh light is thrown upon the genesis of the elements. Nature would seem to abhor elements of high atomic weight, and her tendency is to resolve them gradually into elements of lower atomic weight.—*Lancet*.

SACRIFICING THE NATURAL CROWNS OF TEETH FOR BRIDGE-WORK ABUTMENTS.—The practicability of sacrificing the natural crown of a tooth for the purpose of replacing it with an artificial substitute as a means of affording opportunity for the attachment of the tooth to be supplied is always, particularly in early life, and especially because of the probable incomplete development of the root, to be regarded as a serious problem. While it is true that such a procedure will invariably offer a maximum degree of stability in the attachment, and of permanence in the operation, yet in my opinion it is warrantable only in proportion to the accuracy obtained in the adaptation of the artificial crown, and the degree of esthetic perfection achieved in its adjustment. We do know that a good, well-made artificial crown, which has been accurately fitted to a central incisor or cuspid root, and which is then further provided with a rest against the lingual surface of the adjacent natural crown to prevent rotation, will carry a lateral in a manner which justifies a prognosis of reasonable permanence. Yet whether this seemingly ruthless destruction of the natural crowns for this purpose, particularly in the mouths of patients of tender years, is warrantable or not is largely a question which may be determined only by the discretion and good judgment of a conscientious operator.—HART J. GOSLEE, *Items.*

SOME THINGS TO REMEMBER.—By L. P. Haskell, D.D.S., in *Brief.* While Babbitt metal has all the necessary qualities for a dental die, it must be from a proper formula, namely, copper, one part; antimony, two parts; tin, eight parts. This can be had at the dental depots. Much of the ordinary Babbitt metal of commerce has some lead, which ruins it for dental dies.

Pure lead cannot be poured upon a proper Babbitt metal. The melting-point must be reduced by addition of one-sixth tin. This must not be poured hot as it comes from the heater, but stirred until it begins to attach to the sides of the ladle.

In swaging aluminum, it being soft, it is apt to tear over margin of the ridge. To prevent this, cut away the portion of the counter-die which fills into the depressions or undercuts of the die.

In preparing a model for moulding, take pains to flare the sides all around so it will drop readily from the mould. If it even then fails to drop, jar the edge of the flask on the margin of the moulding-box. There is never any necessity for *lifting* it from the mould.

Do not use the Bailey flasks for moulding, as they are too small and bad in shape. Have a sheet-iron flask make five inches in diameter and three inches deep.

For packing the sand use a potato masher, the handle around the sides, and the large end on top.

The horn mallets should have the pointed end, which is useless, cut off about one inch and filed rounded, as that is the proper end to use, the large end being too large for the palatal surface.

In swaging a gold or a platinum plate do not hesitate to slit the front and lap, because it facilitates swaging, and there is no possible objection to it. On the other hand, it is a real advantage, because many a gold plate has

broken through this, the weakest part of the plate, so that by cutting, lapping and soldering, it is strengthened one hundred per cent.

In wiring a plate, or for holding two pieces of metal together, use wire clamps, about three-quarter inch long, made of ordinary iron wire, bending with flat pliers the sides close together but leaving a loop for spring. The ends may be flattened.

All plates can and should be worn higher over the cuspid teeth, and the gum made fuller than elsewhere, if one desires to restore the usual depression arising from the extraction of the cuspids.

DISEASES OF METALS.—In *Harper's Monthly* for April, Prof. E. Heyn writes thus on "Life and Diseases of Metals:" "Many metals show symptoms of poisoning, rendering them unfit for use. Thus steel can, by means of small quantities of hydrogen and under certain circumstances, be very seriously affected. Let us take two steel bars of the same material, both heated to a red heat, one surrounded by air, the other exposed to the influence of hydrogen; chilling both bars in water after heating, we shall find the bar heated in hydrogen to be brittle, whereas the other bar, heated in air, will turn out to be far superior. The hydrogen has in this instance acted like poison upon the heated steel, and very small quantities of such poisonous matter will suffice to produce very violent effects. The disease in question can be radically cured, it being only necessary to anneal the poisoned bar, repeating the process by heating it exposed to air. Indeed, the poisoned steel, if allowed to lie for a long time, will without any further expert treatment show signs of improvement to a certain degree, the poison gradually leaving it. A better treatment still is boiling in water or oil—which process may be compared to using warm compresses in the case of human beings. Metals can become diseased from improper treatment—as, for instance, copper and steel when exposed a certain length of time to temperatures exceeding fixed limits. The copper loses in consequence a great part of its ductility and bending qualities; in steel the disease can become so virulent that a steel bar so infected may break to pieces on falling to the ground. The technical expert calls such disease 'overheating.'" The above quotation may be of interest to the dental profession as having a direct bearing upon platinum. In this connection we quote also from a communication received from The S. S. White D. M. Co., which is valuable as representing expert opinion in regard to the behavior of that metal under certain conditions. It is as follows: "We have occasionally had complaints of platinum tooth-pins being brittle. In every case the history of which we were able to trace it was found that they had been subjected to soldering. It is a well-known fact that some of the base metals have the power of "poisoning" or producing "disease" in platinum when brought into contact with it. At a heat far less than that of the fusing-point of platinum crystallization ensues and the pins become brittle. There is reason to believe that carbon in combustion has under certain conditions a similar effect upon platinum. It is therefore important that dentists in soldering platinum pins should exercise the utmost care, and should be sure that the solder and flux employed are as free as possible from injurious substances."—ED. *Cosmos.*